Railway Mechanical Engineer

October 1944

Published monthly by Simmons-Boardman Publishing Corporation, 1309 Noble Street, Philadelphia, Pa. Entered as second-class matter, April 3, 1933, at the Post Office at Philadelphia, Pa., under the act of March 3, 1879. Subscription price, $3.00 for one year, U. S. and Canada. Single copies, 35 cents. Vol. 118, No. 10.

RAILWAY MECHANICAL ENGINEER

(Name Registered, U. S. Patent Office)
With which is incorporated the RAILWAY ELECTRICAL ENGINEER.

Founded in 1832 as the American Rail-Road Journal

OCTOBER, 1944

Volume 118 — *No. 10*

Published on the second day of each month by
Simmons-Boardman Publishing Corporation

The Railway Mechanical Engineer is a member of the Associated Business Papers (A. B. P.) and the Audit Bureau of Circulations (A. B. C.), and is indexed by the Industrial Arts Index and also by the Engineering Index Service. PRINTED IN U. S. A.

1309 Noble street, Philadelphia, Pa. Editorial and Executive Offices: 30 Church street, New York 7, and 105 West Adams street, Chicago 3. Branch offices: Terminal Tower, Cleveland 13; 1081 National Press bldg., Washington 4, D. C.; 1038 Henry bldg., Seattle 1, Wash.; 300 Montgomery street, Room 805-806, San Francisco 4, Calif.; 560 W. Sixth street, Los Angeles 14, Calif.

Subscriptions, payable in advance and postage free, United States, U. S. possessions and Canada; 1 year, $3; 2 years, $5. Foreign countries: 1 year, $4; 2 years, $7. Single copies, 35 cents. Address H. E. McCandless, circulation manager, 30 Church street, New York 7.

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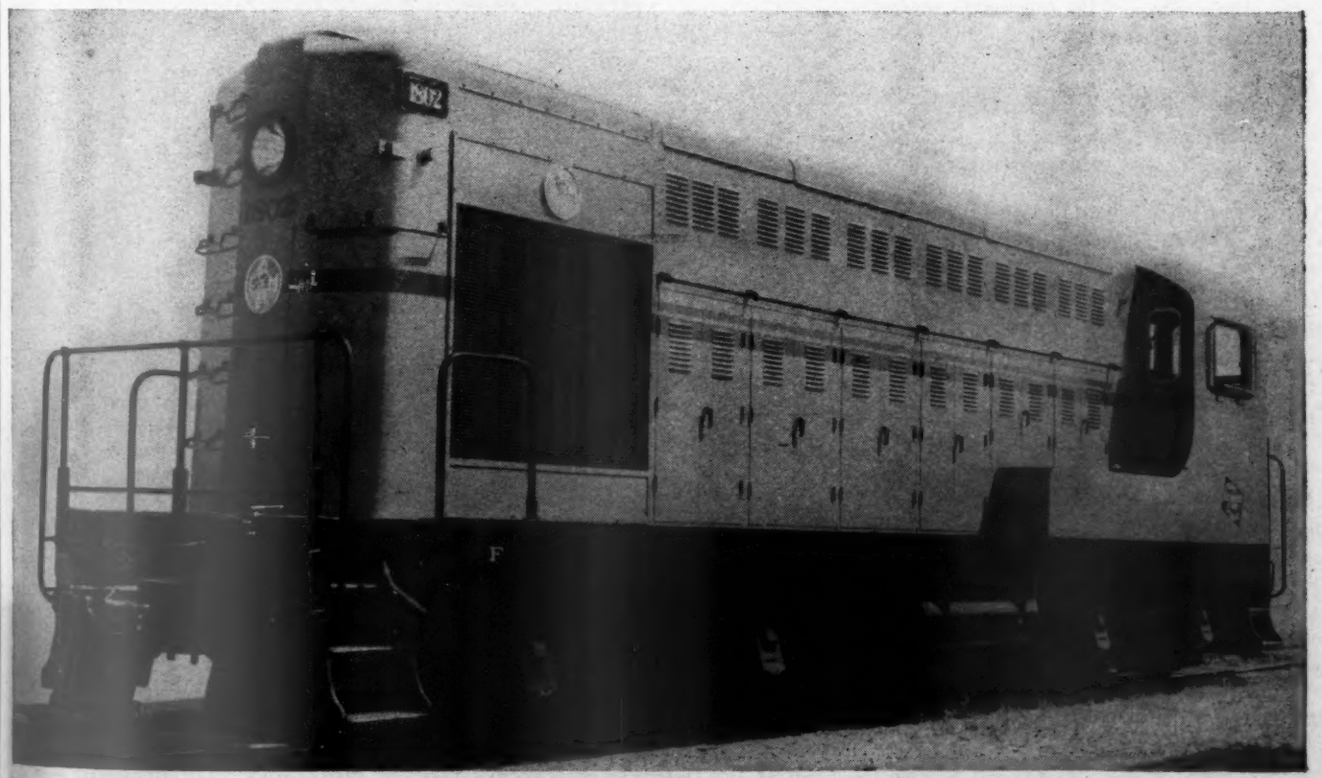
Fairbanks-Morse

Diesel-Electric Switcher

Milwaukee acquires first 120-ton, 1,000-hp. Diesel locomotive to be driven by a Fairbanks-Morse O-P type engine and Westinghouse electrical equipment

THE first unit of the complete line of Diesel-electric locomotives which Fairbanks, Morse & Co. plans to build in sizes up to 6,000 hp. for all classes of service on American railroads, announced in the June issue of the *Railway Mechanical Engineer,* is a 120-ton switcher driven by a 1,000-hp., six-cylinder, two-cycle, opposed-piston Diesel engine, with Westinghouse electrical equipment, including direct-connected generator, truck-mounted driving motors and electrical controls. The locomotive was built for and delivered to the Chicago, Milwaukee, St. Paul & Pacific with christening ceremonies at the Fairbanks-Morse plant, Beloit, Wis., on August 8 and placed in three-shift switching service at Milwaukee, Wis., where it is being thoroughly tested.

Among the objectives sought in developing this locomotive are high efficiency, low fuel consumption, low maintenance, smooth operation over a wide range, easy accessibility for inspection and repairs and high availability. Referring to the table, it will be noted that the locomotive weighs slightly over 120 tons, loaded ready for service, and develops a starting tractive force of 61,130 lb. at 25 per cent adhesion. It is designed to operate safely at speeds up to 60 m. p. h. and to negotiate curves with a minimum radius of 80 ft. In Milwaukee practice, the minimum permissible speeds with this locomotive have been set at 7.5 m. p. h. for one-half hour and 9.1 m. p. h. for one hour and for continuous.



Fairbanks-Morse switcher for the Chicago, Milwaukee, St. Paul & Pacific

A feature of this locomotive is the fact that from the deck down it represents well-tested construction with no particular innovations in design. The one-piece cast-steel underframe and truck frames are General Steel Castings design, with springs, equalizers, journal boxes, bearings, wheels and axles conforming to current Milwaukee standards. The two four-wheel trucks have 6½-in. by 12-in. journals and are equipped with Edgewater 40-in. heat-treated steel wheels and A.S.F. unit-cylinder clasp brakes. Four driving motors are applied, one on each axle with spring-nose suspension from the truck frame, the wheel and axle assembly being easily removable with each motor. Renewable hardened-steel wear plates and liners are installed on the truck pedestal jaws and also on the plain friction side bearings.

The draft-gear pockets are cast integral with the underframe and Edgewater ring-spring draft gears are installed. The A.S.F. vertical-plane swivel couplers are A.A.R. standard Type E, top-operated.

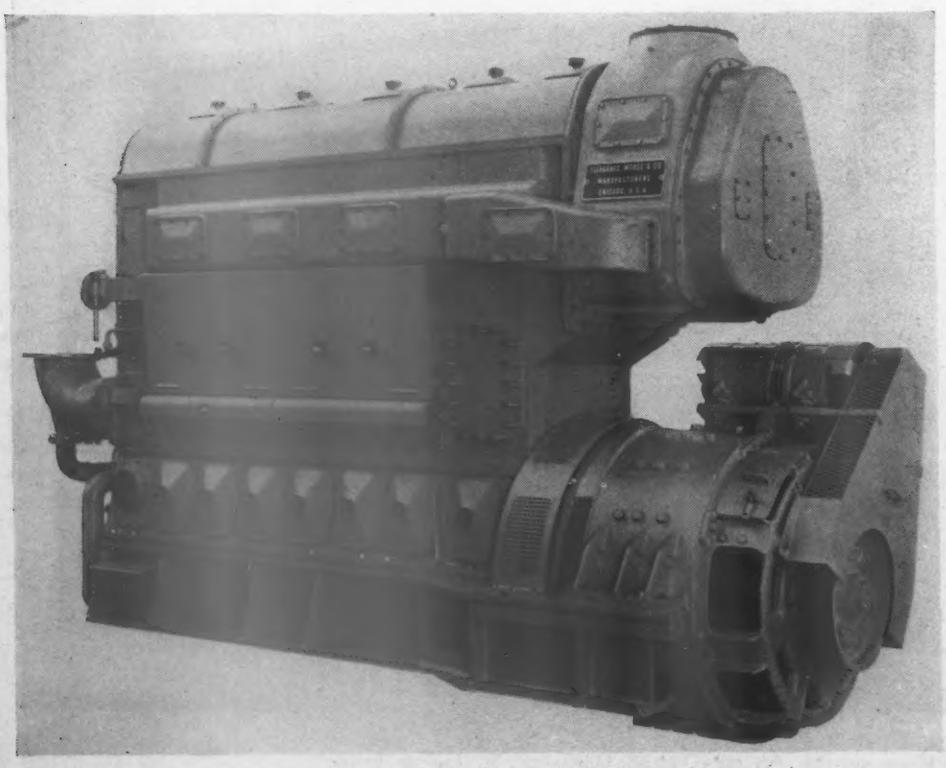
General Dimensions and Weight of New Milwaukee 1,000-Hp. Diesel Switcher

Width overall, ft.	10
Width of power plant compartment, ft.	6
Height above rail (max.), ft.-in.	14- 6
Length (inside knuckles), ft.-in.	48-10
Wheel base, each truck (rigid), ft.	8
Truck center spring, ft.-in.	25- 6
Number of drivers, pairs	4
Diameter of drivers, in.	40
Size of journals, in.	6½ by 12
Minimum radius of curve, ft.	80
Weight on drivers, ready for service, lb.	244,520
Tractive effort, starting at 25 per cent adhesion, lb.	61,130
Maximum safe speed, m.p.h.	60
Supplies (total capacity):	
Fuel oil, gals.	750
Lubricating oil, gals.	200
Engine cooling water, gals.	100
Sand, cu. ft.	28

The instrument board and air-brake pedestal in the cab seen through the engineman's window

The locomotive cab and hood are substantially built of steel with sections of the hood over the engine and generator removable. Steel doors on each side and on the front radiator compartment make the interior of the hood easy of access for inspection and servicing. The cab is thoroughly insulated, equiped with safety glass on all windows, with air-operated window wipers, with one cushion swivel seat on the right side and a portable, movable, auxiliary box-type seat on the left. The cab is heated when required by a Kysor hot-water heater, and a Vapor 4015 standby heater is installed to maintain the desired minimum temperature of engine cooling water when the locomotive is not in use and subject to freezing temperatures. Suitable louvers supply air for the engine and ventilating purposes and automatic shutters and a variable-speed motor-driven fan provide for temperature regulation.

The control stand, located at the left of the engineman's position, carries in a single unit control levers for the Westinghouse Schedule 6 DS straight and automatic air brake, King bell ringer, Brewster sander and the instrument panel. Mounted on this panel are a single lever-type throttle control and reverser, control switch, exciter-field switch, load ammeter, lube- and fuel-oil pressure gauges, necessary temperature gauges, wheel-



Fairbanks-Morse 1,000-hp. O-P Diesel engine direct-connected to the Westinghouse generator

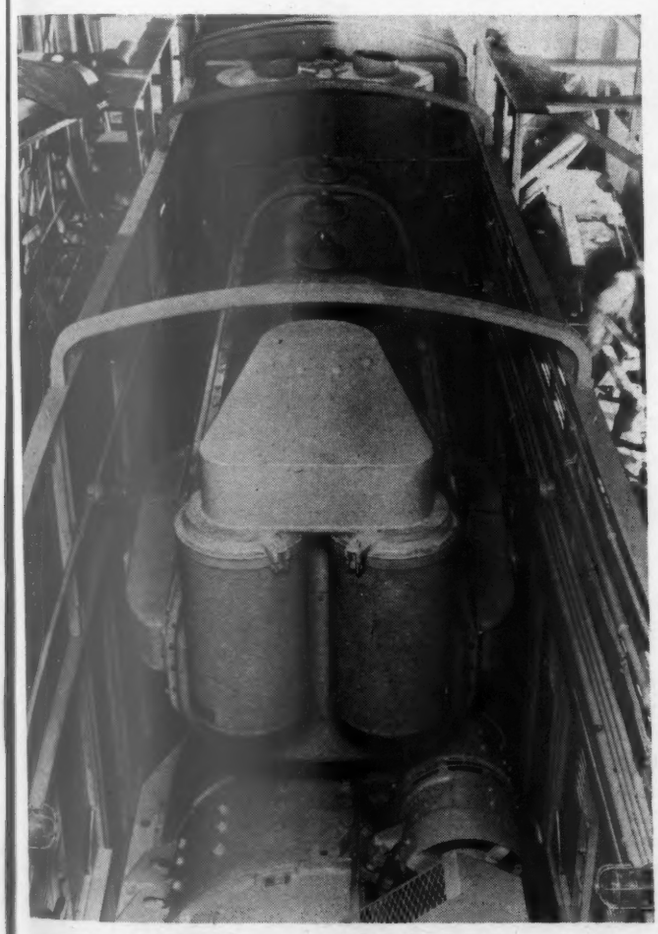
slip indicator, high water-temperature indicator, air-brake gauges, engine shutdown lever and switches for all lights, including engine starting, heaters and fuel oil pump, etc. The Pyle-National headlights are equipped with 250-watt lamps.

The Westinghouse, two-stage, three-cylinder air compressor is mechanically driven through flexible coupling connection to the main engine, and includes an intercooler, unloader and air-intake filter. The displacement at full engine speed is 246 cu. ft. per min., and 92 cu. ft. per min. at idling speed. Four sand boxes have a total capacity of 28 cu. ft. and sand traps are arranged for sanding both leading wheels in either direction.

Features of the Electrical Equipment

The Westinghouse single-bearing electric traction generator is connected to the engine through a flexible coupling, separately excited from an exciter generator mounted on the main generator and driven by V-belt from the shaft extension. The auxiliary generator part of the exciter-generator unit supplies power for one traction-motor blower motor, controls, lighting and battery charging.

A special generator, supplying current for the motor-driven radiator fan, is driven by V-belts from the shaft extension of the compressor. It is mounted on a bedplate and carries the rear traction motor blower runner on its shaft extension.



The hood removed to show the top of the O-P engine

The front traction-motor blower is motor driven. It is of the series type with power supplied by the auxiliary generator. Motor and blower are built into a single unit.

The control panel is accessible for the cab

Four Westinghouse 362-D series-wound axle-hung traction motors with forced ventilation and single reduction gearing are installed in the four-wheel trucks. Class B insulation is used on all generators and motors. Controls are remote electro-pneumatic, 125-volt, single station. The control equipment is arranged to operate a group of two motors in series and two groups in parallel, with full field and the same connections with shunted field.

The No. 1 and No. 3 traction motors and the No. 2 and No. 4 traction motors are permanently connected, which maintains a maximum of traction in case of slippage of either lightly loaded driving axle. A single lever control is used for reversing and throttle. The main engine is equipped with Westinghouse load control to give maximum power output and overload protection under all operating conditions. The engine is started electrically with power from an Exide 56-cell battery through a main-generator starting winding. A lever key protects the locomotive when the operator leaves the cab, the engine being stopped and all controls opened when the key is removed.

Characteristics of the Diesel Engine

The Fairbanks-Morse O-P, or opposed piston, Diesel engine, installed the new Milwaukee switcher, is essentially the same type as that so extensively and successfully used in naval service during the war and also in six two-car streamline trains, built for the Southern by the St. Louis Car Company in 1939. The engine utilizes the two-cycle principle and has a vertical bank of six cylinders with two 8⅛-in. pistons operating on a 10-in. stroke in each cylinder and hence requiring two crank shafts. This engine is designed to develop 1,000 brake horsepower at 800 r. p. m. to the traction generator plus all

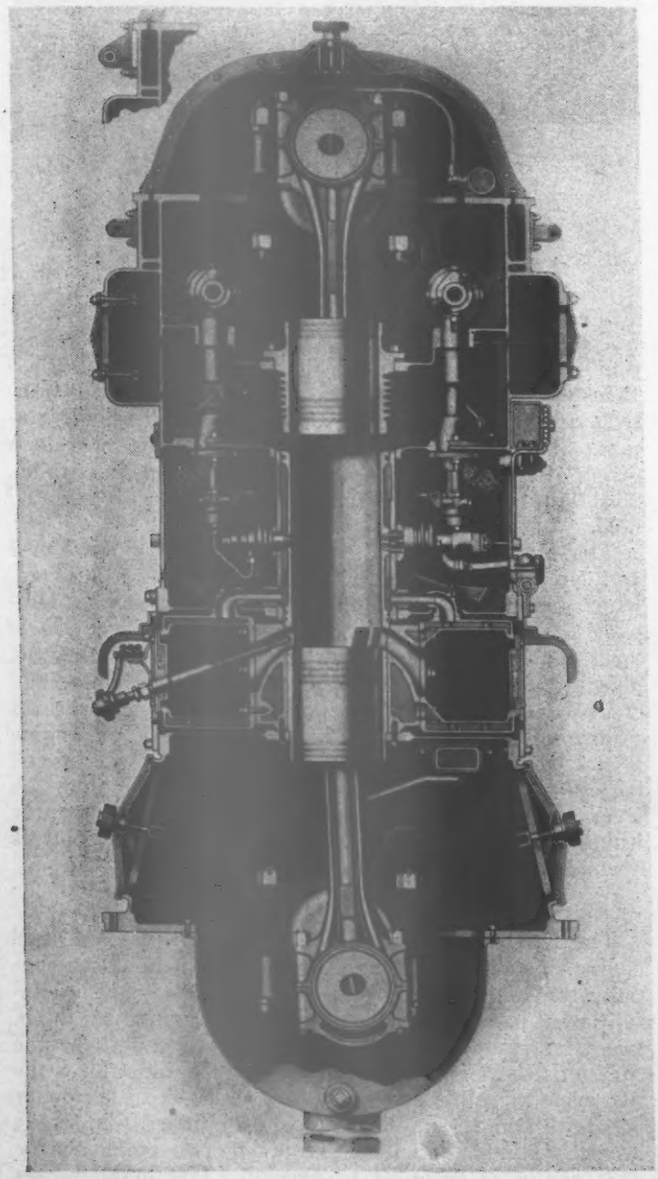
power needed for auxiliaries. The idling speed is 350 r.p.m.

The underlying principle of the O-P Diesel engine is the use of a plain open-end cylinder in which combustion takes place in the center of its length between two pistons which move away from each other, and in doing so uncover the exhaust and air inlet ports, thus eliminating all valves. The pistons controlling the air inlet ports are connected to the upper crankshaft while those controlling the exhaust ports are connected to the lower crankshaft. The two crankshafts are mechanically connected by means of a vertical shaft with spiral bevel gears and a spring coupling, thereby transmitting power from the upper to the lower shaft and maintaining the proper timing between the upper and lower pistons. In reality, therefore, with a pair of pistons in each cylinder, the six-cylinder engine becomes a 12-cylinder engine. Engines of this type are made in various sizes having from 3 to 10 cylinders and ranging from 150 hp. to 2,000 hp.

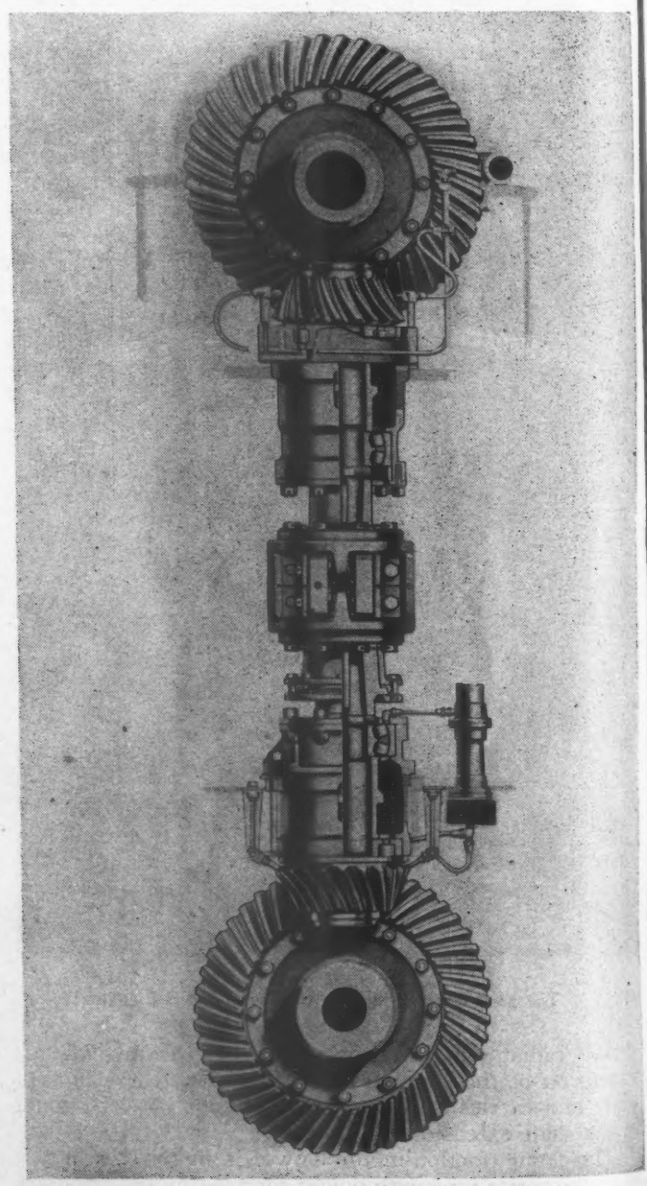
The cycle of operation in the O-P engine begins with the movement of the pistons from their outer dead centers. After the pistons have covered the exhaust and air inlet ports, the air between the pistons is compressed and as they approach inner dead center, fuel is injected into the combustion space where the heat generated during the compression of the air ignites the fuel. Combustion and the resulting expansion, forces the pistons outward on the power stroke, thereby delivering work to the crankshafts.

The burning and expanding of the gases continues until near the end of the powerstroke. At this point the lower piston uncovers the exhaust ports allowing the burned gases to escape to the atmosphere. The upper pistons next uncover the inlet ports and air, supplied by the blower, rushes into the cylinder, cleans out the burned gases and at the same time produces a whirling motion in the scavenging air which continues throughout the compression stroke and injection period and contributes to the combustion of the fuel.

With cylinders 8⅛ in. in diameter and 10 in. stroke, it is possible to develop in excess of 200 hp. per cylinder with the O-P Diesel engine design. This represents power output available to the traction generator. The lower crankshaft leads the upper by 12 deg. to give proper timing of the opening and closing of the inlet and exhaust ports. The lower crank develops about 80



Cross-section of Fairbanks-Morse O-P Diesel engine



Vertical-drive connection between the upper and lower crank shafts

One of the water-jacketed cylinder sleeves

per cent of the total power and the upper crank, which drives auxiliary equipment, including the blower, develops the remaining 20 per cent.

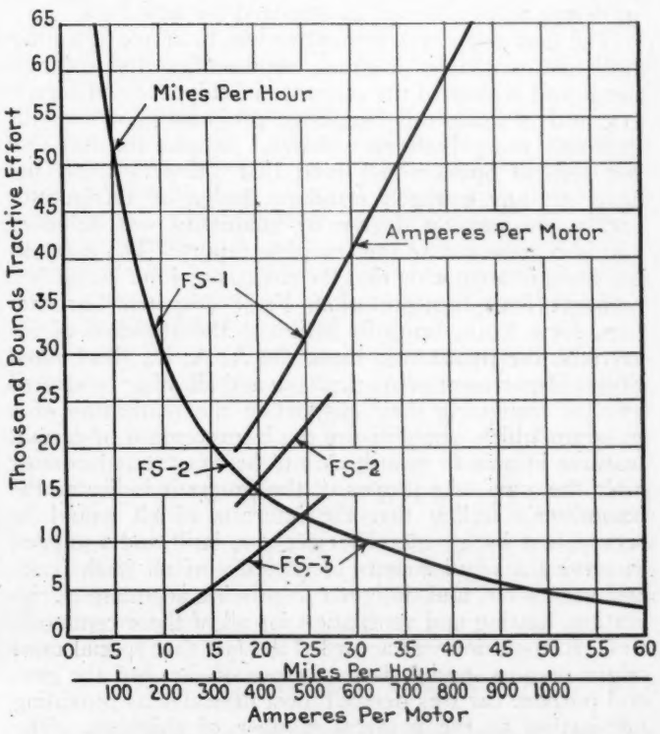
The engine is a complete self-contained unit with attached rotary type blower, fuel, lubricating oil and water pumps. The main frame or cylinder block is of welded construction. Both crankshafts are a cast chrome-nickel-molybdenum alloy and the bearing surfaces are ground and polished to give an accurate durable wearing surface. The shafts are supported in the main frame by removable bearings between each cylinder and at each end. Connecting rods are one-piece steel forgings fitted with removable wristpin bearings and removable crankpin bearings. All crankshafts and connecting rods are drilled for passage of the lubricating oil for lubrication of the bearings and piston cooling. A crankcase ventilating system is provided which also prevents oil leaks.

The scavenging air blower is of the multiple spiral lobe, positive-displacement type, driven from the upper crankshaft by means of helical gears and the timing of the impellers is positively maintained by precision gearing. Both exhaust manifolds are water cooled and removable without major disassembling.

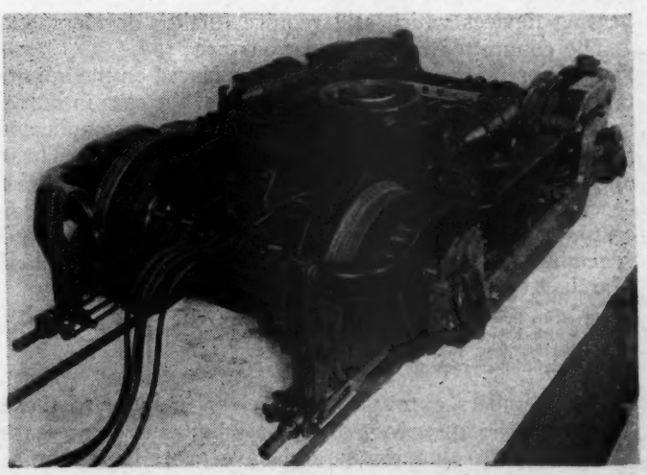
The governor is of the Woodward hydraulic type and controls the quantity of fuel delivered by the injection pumps to the fuel injection nozzles. Provision is made for adjusting the governor to vary the engine speed to meet the requirements of the specific installation. A built-in overspeed governor automatically shuts down the engine if the speed exceeds a predetermined maximum limit.

A built-in rotary-type fuel supply pump is furnished which delivers fuel from the service tank through suitable filters, to individual fuel injection pumps for the two injection nozzles in each cylinder.

Water for cooling the engine is supplied by a built-in gear-driven centrifugal pump. The built-in lubricating oil pump is of the herringbone gear type and furnishes lubrication for the entire engine including main bearings, piston pin bearings, camshaft bearings, etc., thereby eliminating the hand oiling of any of these parts.



Calculated performance of the Milwaukee 1,000-hp. switcher built by Fairbanks-Morse



The motor trucks are of conventional design

Growers and Shippers Study

Refrigerator Car Design

Report favors general-purpose car — A. A. R. dimensions followed — Provides car builders with users' thoughts on design

As a result of action taken at the annual meeting of the United Fresh Fruit & Vegetable Association held this year, a committee was appointed to study refrigerator cars and the rail transportation of fresh fruits and vegetables. The association, recognizing that few cars were being built during the war and that those in service were wearing out at an accelerated rate because of wartime demands, felt that a fairly extensive new construction and rebuilding program would be required after the war. Its action in appointing the committee was intended to provide a careful consideration of needed improvements in design to be adopted as standard for new cars.

The first aim of the committee was to arrive at a practical and workable program, representing the common needs and wishes of the majority of shippers and receivers, and to make this suggested program known to the railroads and private car owners. Despite the fact that the general opinion had been that shippers could not agree on any common standard design of refrigerator car, a considerable degree of unanimity was achieved and is represented in the complete report. The committee voted unanimously that the chairman, John N. Kelley, manager fruit transportation, Fruit Dispatch Corporation, New York, bring its action to the attention of the carriers, the private car lines, the A. A. R., the United States Department of Agriculture and all other interested groups, requesting their support in the realization of a program which would insure the incorporation of certain features in new or rebuilt cars to be constructed now or after the war. As proposed, the program indicates the committee's feeling that the interests of all would be served best by a general-service car, built and equipped to serve the requirements of shippers of all fresh fruits and vegetables, and designed to provide adequate refrigeration, heating and ventilation for all of these commodities. Recognition was accorded the fact that special cases might require special sizes or types of cars but the general-purpose car was deemed most desirable as providing satisfaction to the greatest number of shippers. The specified use of ice or ice and salt as refrigerants was not intended to exclude further testing of other methods but the committee felt that immediate suggestions for car construction could not include either refrigerating or heating devices which still require further development.

The committee recommendations are:

1—Dimensions.—Great stress was placed on the importance of having the inside dimensions of the cars uniform, because lack of uniformity in this respect complicates the proper loading of many packaged commodities. These dimensions are to be the same as those called for in the specifications of the A. A. R. standard freight refrigerator cars, ice, ventilated type, suitable for fruits and vegetables, as covered in the A. A. R. specification dated March 1, 1940:

Inside clear length between bunkers, ft.-in.	33-2¾
Inside width between lining, ft.-in.	8-3
Inside height, floor to ceiling, ft.-in.	7-9*
Inside height, floor-rack to ceiling, ft.-in.	7-3

The members expressed themselves in favor of these dimensions because most of the cars built in recent years have had these dimensions and have proved very satisfactory in service.

*Minimum—To be increased to 7 ft. 10½ in. to accommodate blower fans.

2—Metal under-frames, metal framing, metal outside sheathing, and the use of metal and waterproof plywood, wherever added strength, rigidity and shape retaining can be obtained by their use. It is urged also that the railroads be requested to use the lightest weight metals possible, consistent with the required strength, and to use aluminum or other alloys where suitable. Due consideration should be given to reducing the weight of the car as much as possible, consistent with good construction, to the end that the cost of handling perishable commodities may not be unduly high because of excessive deadweight transported.

3—Steel wheels, easy riding trucks and improved draft gears to enable cars to travel at high speeds and to absorb vertical and horizontal shocks that would otherwise be transmitted to the load.

4—Insulation to be Hairfelt or Hairinsul, with *k* value of not more than .27, or an insulation the equivalent of the hair. Insulation to be installed in continuous blanket form with as few breaks in each layer as possible, and in the following minimum thicknesses, based on the *k* value of .27: 4 in. in the floors and roof; 3½ in. in the side-walls and ends.

5—Water ice to be retained as the source of refrigeration in new equipment, leaving other forms of refrigeration for further study, tests and practical trials.

Strong preference was stated for the end ice-bunkers vs. overhead ice-bunkers, the chief factors being no satisfactory method yet developed of heating with portable heaters in overhead bunker cars; too many hatches to maintain; too slow icing; probable too high cost of maintenance; and generally, hesitancy to go forward with high center-gravity cars with these obvious difficulties, in view of the high-speed schedules generally wanted.

6—Bunkers to be equipped with collapsible bulkheads, half-stage icing and bunkers to have total capacity of not less than 11,000 lb. Hatch plugs and vent covers to be of the direct ventilating type, with special attention given to tight-fitting plugs and easily adjusted ventilators.

7—Fans. Cars to be equipped with blower type fans, operating beneath the floor racks the entire width of the car near the bottom bulkhead openings. Fans to be belt-driven from the wheel tread and the air circulated upwards through the bunkers so as to discharge cold air over the lading through the top openings. These fans to be equipped so they can be operated by electric motors when the car is not in motion.

8—Temperature-indicating devices. Cars to be equipped with distant reading temperature-indicating devices that will enable inside temperatures to be determined from the outside of the car at two points—one at the floor and one at the top, center of car.

9—Appearance. The car to be distinctively new in appearance. While it is recognized that it is not practical actually to streamline each car for wind resistance, all members stressed the importance of having streamlining as far as it is practical to do so, consistent with good and efficient construction.

It was considered highly important that the car containing the above recommended features should also bear the outward marks of change, so as to render a more pleasing, distinctive appearance—in short, a car that would have "sales appeal."

In addition to the above, the committee felt it should ask the carriers and private car lines to give serious consideration to the further improvement, with a view to the eventual adoption of the following:

A—Car heaters. While car heaters are recognized as not being an integral part of a refrigerator car, it was felt that the railroads should be notified of the committee's interest in the development of an improved rugged heater, that could be thermostatically controlled. The prevalence of over-heating and freezing due to the failure of the present heaters constitute a major worry and the development of a better heater is of paramount importance.

B—Air space—side-walls. If it is possible to maintain the inside dimensions as outlined above and provide adequate insulation without exceeding the permissible overall width of the car, it is requested that an air space of not less than one inch be provided between the main wall and the inside lining of the car. This air space to be open top and bottom so as to provide for free circulation of air behind the lining for the better protection of solid loads against heat and cold.

C—Load dividers. The railroads are requested to further study load dividers, with the view to developing a type that can be permanently installed.

D—Double-deck floor racks. Development of a practical double-deck floor rack to be built in cars so that when lifted or folded out of the way, it will not interfere with standard loads, yet one that will permit the loading of bagged products, such as oranges and onions, without crushing the bottom tiers.

Good Housekeeping

The following comments on the practical importance and value of good housekeeping in railway plants and facilities are taken from a bulletin under that title, recently issued by A. B. Wilson, superintendent motive power, Southern Pacific, Sacramento, Calif.

How would you like to work in the cleanest shop, enginehouse, or office in the world? Since we spend most of our waking hours at our jobs, most of you will say, "I would like it." Well, you can have it right where you are, if you are willing to exert a little head-work and some physical effort to fulfill your desire.

There are several good business reasons why good housekeeping is a "must do" in our organization:

1—The morale is higher in clean, attractive surroundings.

2—Such surroundings indicate good supervision.

3—Good supervision coupled with good morale insures maximum production.

4—Good housekeeping is the best insurance from accident and fire.

5—All of which brings forth praise from the management and this in turn makes everyone happy.

The paramount psychological and biological desire of all human beings is to secure as much happiness and avoid as much pain for himself as possible. It is very painful to most of us to be criticized every time our officials inspect our plants and find them untidy. Good housekeeping is not a luxury but a business necessity. In fact it is just as important to do a good job of housekeeping as it is to do a good job of repairing equipment.

Several years ago an enginehouse foreman at a small point was visited by a Federal I. C. C. inspector. The inspector started talking about most everything beside the business at hand. The foreman, who had an unwarranted fear of Federal inspectors in general, was on pins and needles wondering what he would find and report when he made his inspection. Finally he said to the inspector: "When are you going to inspect these locomotives?" The inspector replied, "I am in no hurry; when I go to an enginehouse and it is nice and clean and in order I do not expect to find many defects. When I find a place that is dirty and untidy I get out all the pencils I have and sharpen them, because I know I am going to need them."

A good many of our supervisors contend that a lot of laborers are needed to keep a place clean. This is an erroneous viewpoint. One careless employee can make enough mess to keep several laborers busy cleaning up after him. What we have to do is to sell the idea of good housekeeping to every man in the plant, make him want to have a clean place to work and be willing to help keep it clean. In other words, stop making dirty conditions that have to be cleaned up.

By what line of reasoning could we justify an oiler carrying an oil can around that leaked, or sloshed over, and another man to follow him around to clean up after him; or brickman throwing brick out of a firebox, or sand out of a front end onto the floor for someone else to clean up, when he could just as easily have shoveled it into a refuse wagon. It does not cost a cent more or require any more effort to place material or tools in order when delivered to any given point, than it does to place them without regard to order, thus creating an unsightly condition.

"Head-Work" Counts

Several years ago a small terminal was visited that had formerly been an important point handling lots of power; because of extending crew terminals it was reduced to small proportions. All the buildings and facilities were still intact and used daily by a small force. We were amazed to see how clean and orderly the plant was maintained, and asked the machinist who was in charge how he accomplished such outstanding results. Here is what he said: "Well, there are only three of us here—myself and two engine watchmen, one on each of the night shifts. We got together and agreed that each one of us would clean up after himself and that the plant would be divided into three areas, and each one of us would be responsible for keeping our assigned area clean."

The results were amazing, and it is our contention that if three men can do this, 30 or 300 or 3,000 men can do the same. It is simply a matter of getting together and doing the job.

Our top officers insist that "good housekeeping" is an absolute necessity, and when promotions are made you can be assured that "good housekeeping" is duly considered; in many cases the fact that a man was a good housekeeper has swung the balance in his favor.

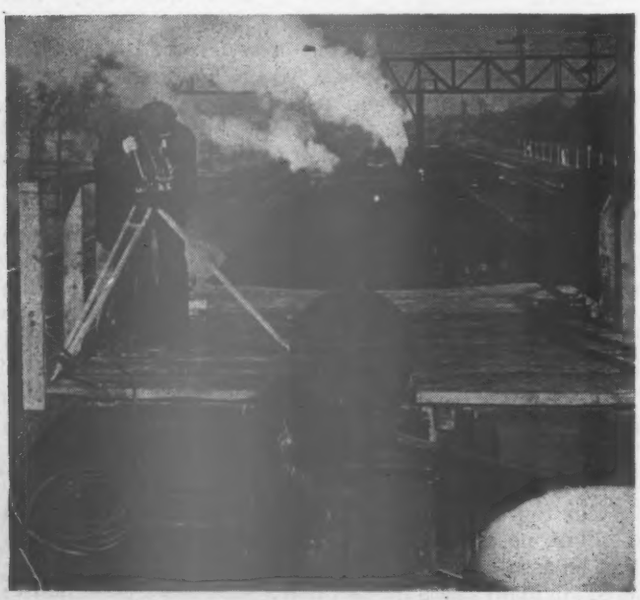
A 15,000-gal. tender with water scoop and venting arranged for taking water without loss of speed

Scooping Water at 80 M. P. H.

New York Central has evolved an efficient scoop and a system of tender venting which permits locomotives to take water without reducing speed

SEVERAL years ago the New York Central began a program of development of the method of scooping water from track pans looking toward an increase in the train speed at which water could be taken effectively. The first step in the program was improving the tender water scoop to increase its capacity and the efficiency with which it delivers water into the tender tank.

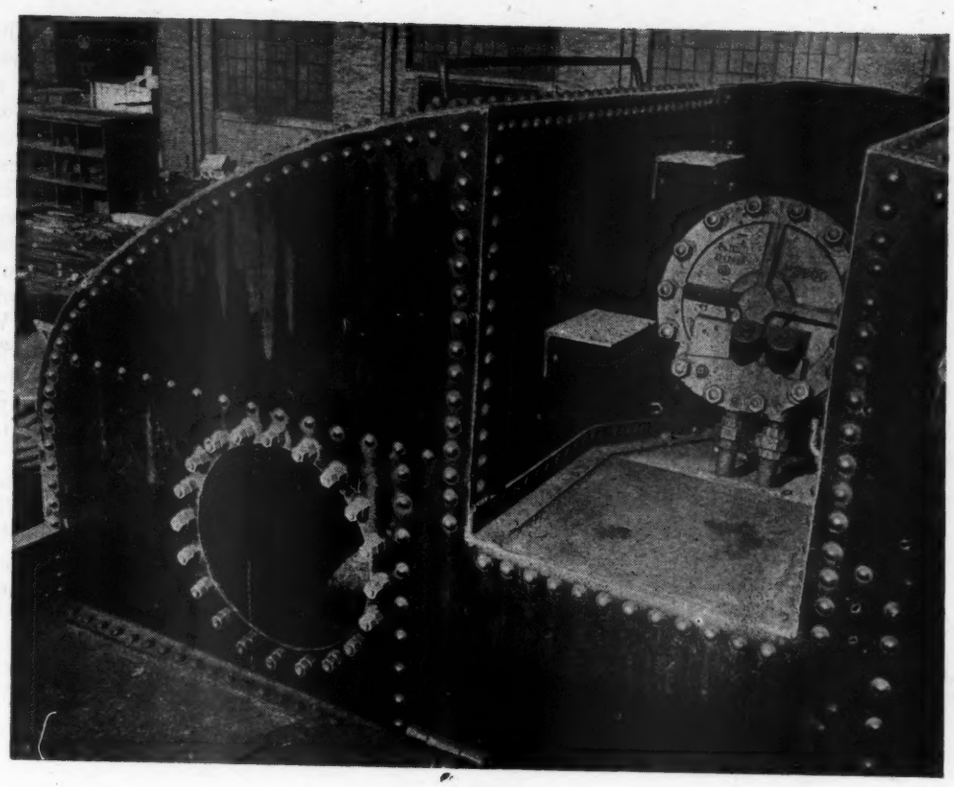
The standard scoop had a deep mouth and was reduced in cross-section to a minimum area of 69 sq. in. at the first joint back of the mouth of the scoop. The axis of this joint of the scoop intersected the surface of the water at a relatively steep angle, thus tending to push the water forward in the trough in the form of a wave in advance of the mouth of the scoop. The redesigned scoop, which, like the earlier standard, has two flexible joints, is shaped to extend into the water pan at a relatively flat angle with the mouth reaching forward sufficiently to take in at least part of the wave built up in advance of the scoop by its movement through the water. The cross-sectional area of the new scoop is uniformly 104 sq. in. from the mouth to the inside of the tender bottom.



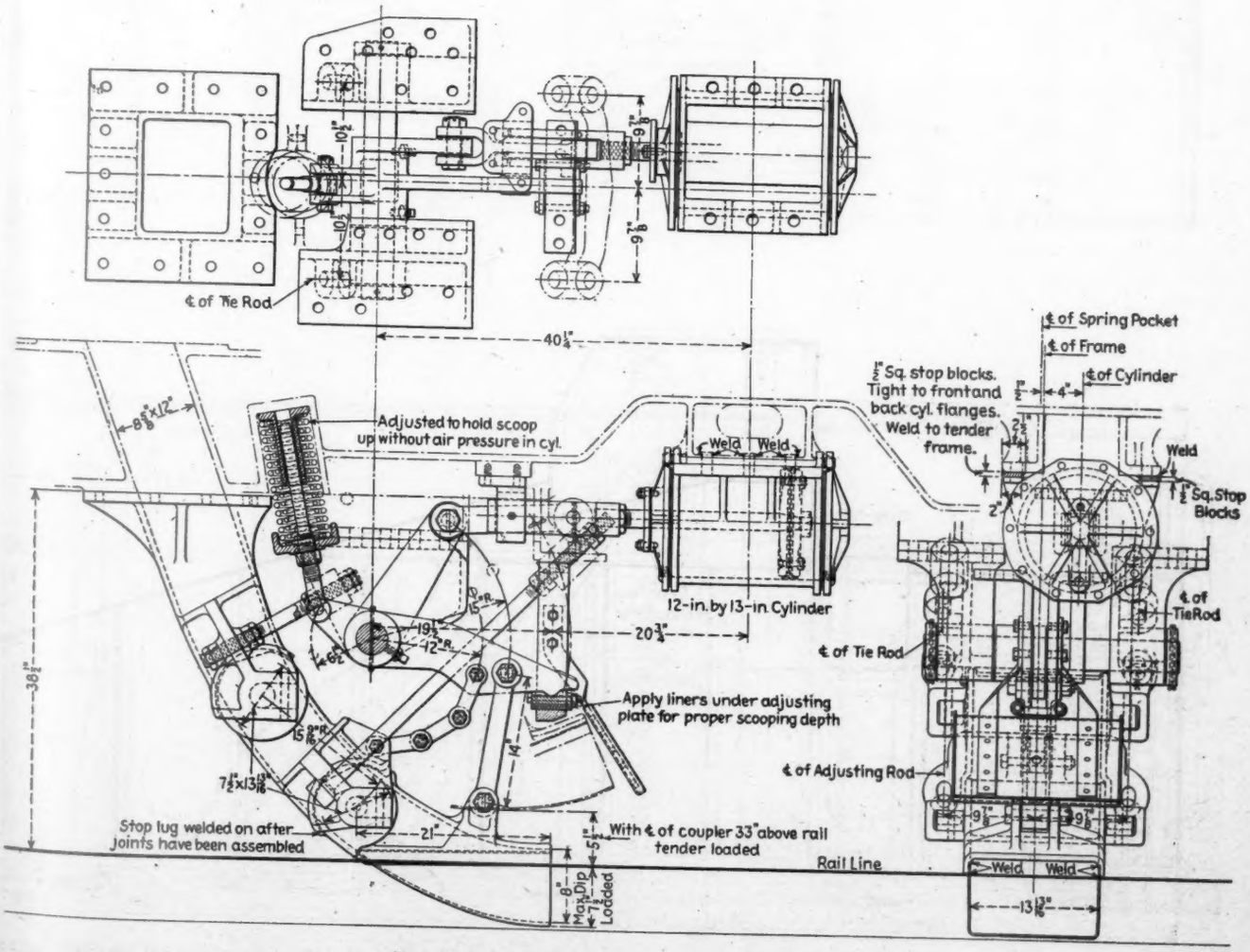
Observer's platform for the water-scoop test

The new scoop was developed and comparative tests were conducted in 1939. The former standard scoop developed its best efficiency at about 45 miles an hour. The new scoop does its best at about 75 miles an hour. The tests were run on a 2,000-ft. track pan with an actual water scoop distance of 1,700 ft. With a 7½-in. scoop setting the new scoop delivered 6,953 gals. into the tank at 60 miles an hour, an increase of 42 per cent over the performance of the former standard, and at 75 miles an hour delivered 7,113 gals., an increase of 48 per cent over the performance of the former standard scoop. At 60 and 75 miles an hour, respectively, the new scoop spilled 1,938 and 1,520 gals., a reduction of 54 and 64 per cent, respectively, over the spillage from the operation of the former standard scoop at these speeds.

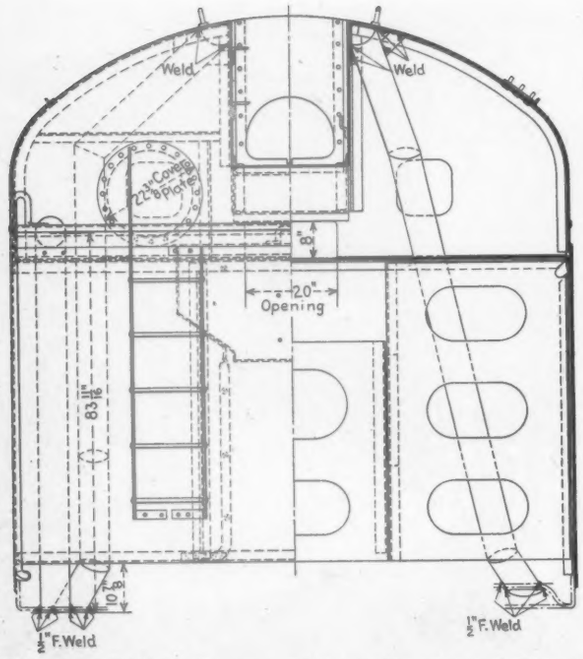
For raising and lowering the water scoop air is admitted to one end and exhausted from the other end of the cylinder through a valve on the front of the tender. By the incorporation of quick air-release valves in the air lines adjacent to the cylinders so that the exhaust did not have to flow back through the long line to the valve, the time of lowering and raising the new scoop was decreased about 54 per cent as compared with the former standard arrangement. This increase in the speed of operation has increased the distance through which water can be taken with the same margin of safety. This, it was estimated, would add some 600 gals. to the figures



The auxiliary overflow reservoir seen from the rear, with manhole cover removed—Note the coal pusher cylinder in the central space



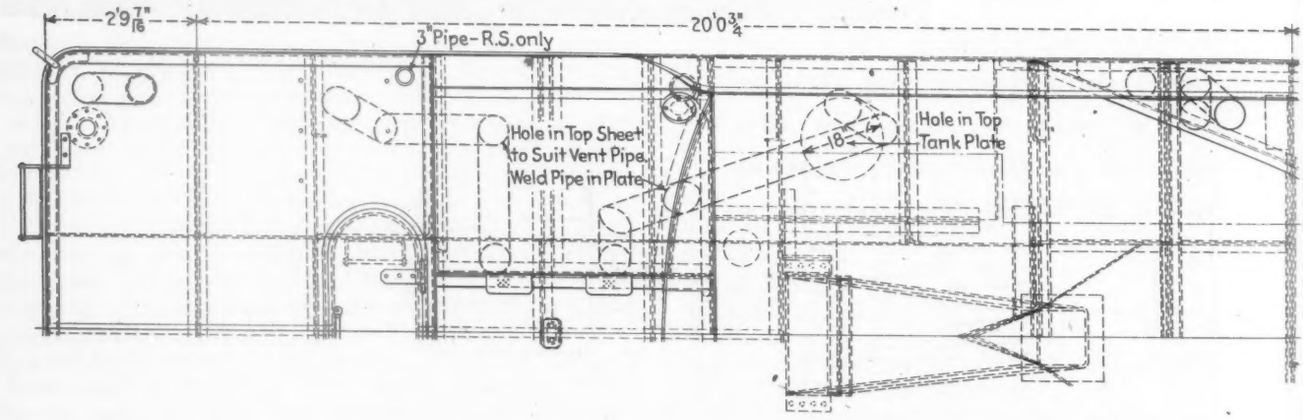
New York Central tender water scoop arrangement

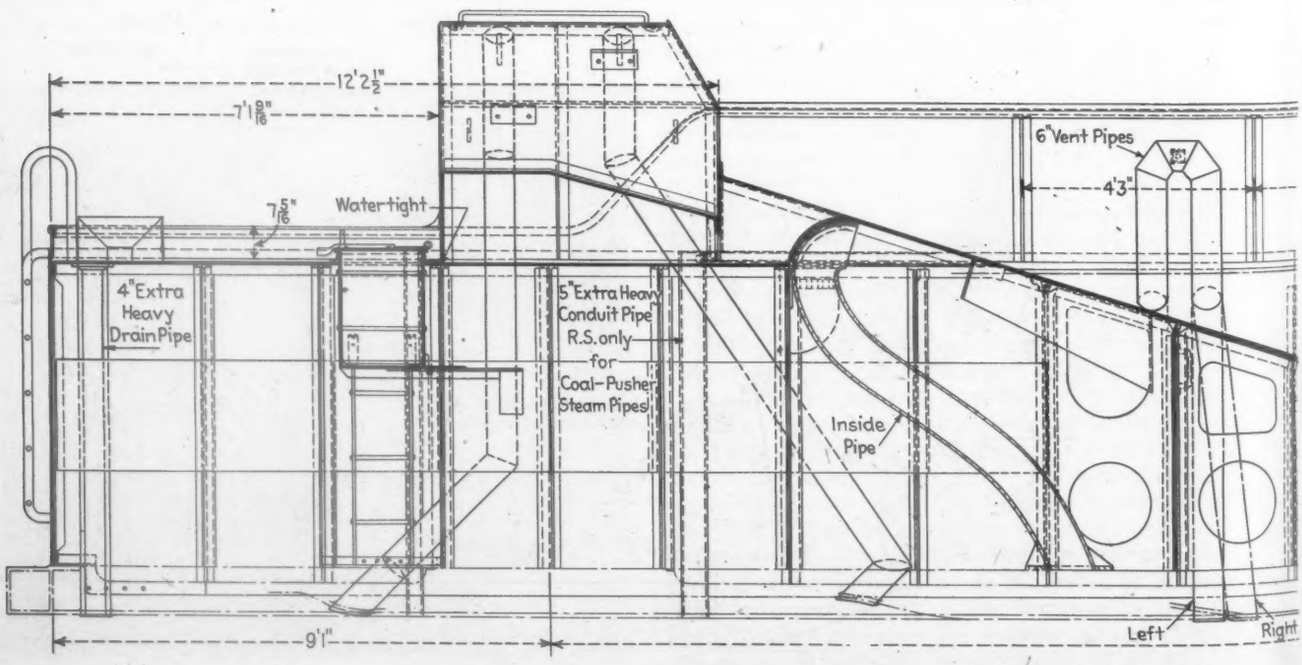


Looking forward from the rear of the tender with a half section through the auxiliary overflow reservoir

which were attained in the tests before the incorporation of the quick release valves.

As locomotives were equipped with the new scoops water was taken from the track pans at speeds up to 80 miles an hour. Then occasional cases of broken cab and coach windows on trains passing at water pans began to be reported. A series of test runs were, therefore, planned in order to determine definitely what happened on the tender during the periods of scooping. In this work a motion-picture camera was used. A platform was built over the back part of the coal space to accommodate camera and observers. Water was taken at speeds from 45 miles an hour up to 80 miles an hour. At the higher speeds water began to be discharged from vents in the vertical wall immediately back of the coal space within two or three seconds after the scoop had been dropped into the pan and soon thereafter the water began to spray out from under the cistern cover with evidence of considerable pressure. The top of the tank back of the coal space was soon filled with water which then splashed over the side coping in waves, providing water in sufficient body to account for the damage which was being reported. Indeed, at the higher speeds the pressure was so great that the lock of the cistern cover was forced and the cover blown open, to release an out-rushing column of solid water. In these tests the conditions were



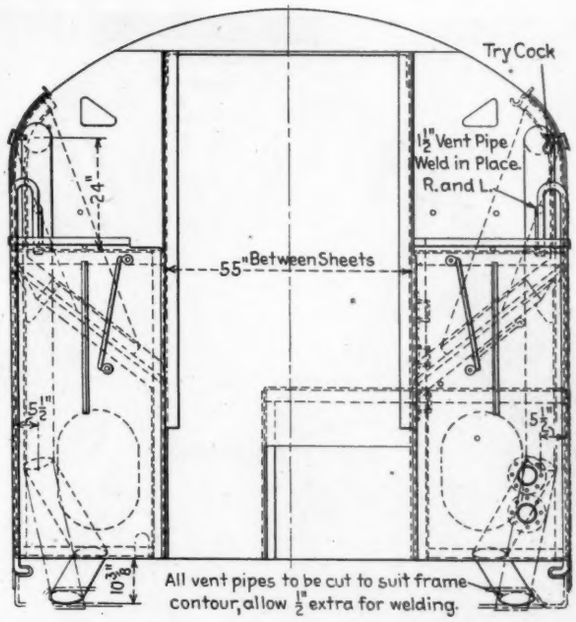


There are seven vents for air and water along each side of the tender, two of

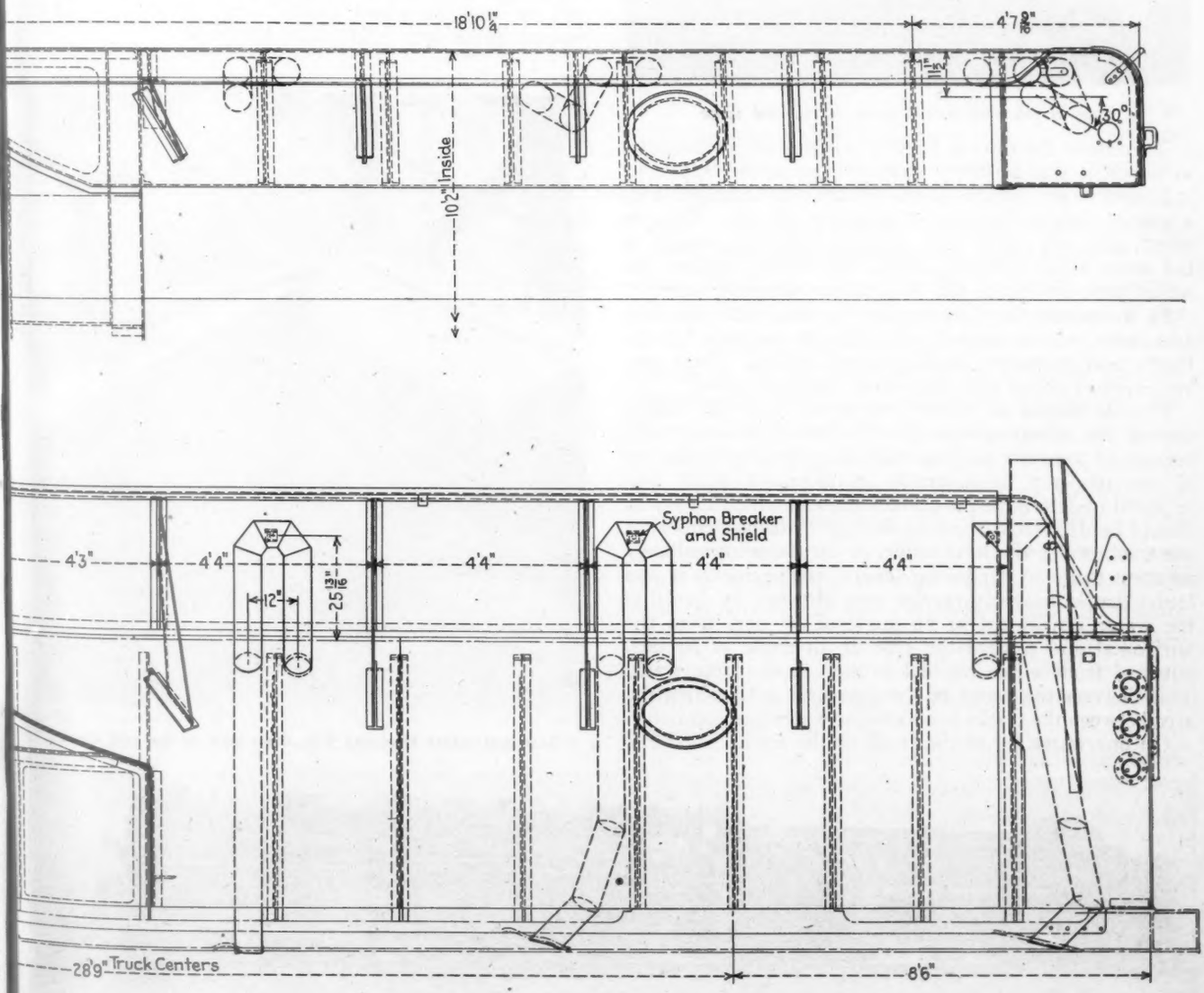
purposely made abnormally severe by starting each run with the tank about two-thirds full and delaying the pick-up of scoop until the end of the pan was reached, thus deliberately causing an excessive overflow.

Then began the development of a system of venting the tender tank to relieve the air and water pressure built up by the in-rush of the water from the scoop. As the drawing shows, the water is carried upward and backward in a closed conduit which gradually increases in cross-sectional area to a point just under the coal pit slope sheet. Here, the direction is reversed so that the water is directed down the underside of the slope sheet against a V-shaped divider which diverts the water to the side compartments and up to the front of the tank.

There are seven vents, each 6 in. in diameter, along each side of the tender tank, which open at the top of the water space. Five of these are carried through return bends above the top of the tank, back through the water space and thence down to outlets through the water-bottom tender frame. In addition to these vents, a 600-gal. auxiliary overflow reservoir is located above the tender water space immediately back of the coal space. This reservoir is divided by space in the center required to take the coal-pusher cylinder. Two of the vents on each side of the center extend down from the top of the reservoir to outlets through the bottom of the tank.



Front elevation of the tender showing three recesses for try cocks in the side of the water leg and the top try cock in the return bend of the front vent pipe



hich lead from the top of an auxiliary overflow reservoir immediately back of the coal space

Some of the vent return bends in the coal space

To relieve the cistern cover from the severe pressure to which it was formerly subjected an inside trap door is hinged to the bottom of the cistern and arranged with a counterweight to keep it normally closed. This, in effect, acts as a check valve, opening under the weight of the water from a water column but closing against the water pressure inside the tank when scooping water.

In the return bend at the top of each vent pipe is a 1-in. vent which extends out through the side of the tender and discharges behind a small shield. These prevent syphon action after the scoop has been raised.

By this means all water discharged from the tender during the scooping operation is delivered below the bottom of the tank and no water is spilled from the top of the tender. Considerable development work was required to determine the correct angle at which the water should be delivered to avoid damage to ballast either on the track under the locomotive, or on those immediately adjacent to it. After trying several arrangements it was found that satisfactory results were obtained by directing the water downward at an angle of 45 deg. from the horizontal and toward the rear at an angle of 30 deg. outward from a line parallel to the center of the track. This delivers the water to the pavement with which the area between the tracks is covered at water-pan locations.

On one water leg at the front of the tender are three gauge cocks for the fireman's use in determining the water level in the tank. Two additional cocks have been added, one to the tank top and one to the front of the return bend extension on the front vent pipe. The locations of these vents are shown in the drawing. Just before reaching a water-pan location where water is to be taken the fireman first opens the try cocks. The scoop is then dropped into the water pan. A nominally full tank is indicated when water flows out of the tank top try cock and the maximum amount of water has been scooped when water flows from the upper try cock on the forward vent elbow.

The tender overflow equipment has been installed on the tenders of the Class L-4B 4-8-2 type locomotives delivered by the Lima Locomotive Works in December, 1943, and 60 new large capacity tenders now under construction will have this arrangement. Other locomotives are being equipped by the railroad in its own shops. The L-4B locomotives are essentially the same as the L-4A type delivered by the same builder early in 1943. They develop a tractive force of 59,900 lb., have 72-in. driving wheels, and have 26-in. by 30-in. cylinders and an indicated horsepower of 5,200 at 73 m. p. h. The boiler pressure is 250 lb. per sq. in. There is 4,676 sq. ft. of evaporative and 2,082 sq. ft. of superheating surface.

The tenders on the new locomotives have a capacity of 15,200 gals. of water and 42 tons of coal. They are carried on two six-wheel trucks, with 6½-in. by 12-in. journals fitted with SKF roller bearings.

Rear vent return bend and 4-in. drain back of the coal space

One of the L-48 type locomotives built by the Lima Locomotive Works with tenders designed for scooping water at high speeds

EDITORIALS

Comparative Age of Railway Cars

Some interesting figures, just released by the American Railway Car Institute, cover the age of freight-carrying cars and passenger train cars on Class I railways, as of January 1, 1944, and show what drastic steps must be taken to acquire new car equipment just as soon as practicable if the car inventory is to be kept within any kind of reasonable limits from an age standpoint. The accompanying table tells a story more eloquent than words.

Age of Cars on Class I Railways, January 1, 1944

	Freight cars	Passenger cars
1 to 5 years old	13.85 per cent	2.35 per cent
6 to 10 years old	8.65 per cent	4.71 per cent
11 to 15 years old	8.98 per cent	8.35 per cent
16 to 20 years old	20.79 per cent	22.89 per cent
21 to 25 years old	17.03 per cent	12.32 per cent
Over 25 years old	30.7 per cent	49.38 per cent

In general, the freight-car picture appears more favorable on a percentage basis than conditions in the passenger field, but not much. With a total ownership of 1,756,634 freight-carrying cars on Class I railways, 243,301 cars, or 13.85 per cent are from one to five years old. About 539,329 cars, or 30.7 per cent, are over 25 years old. An examination of detail figures of the individual carriers shows how much better off some are than others, as regards the age of freight equipment. Most box cars, for example, are probably between 11 and 20 years old, but on a number of large roads more than half of their box-car equipment is over 25 years old. By way of contrast, there are a few roads, generally smaller in size, which have 50 per cent of their box cars less than five years old. This indicates that a real program of replacing worn-out box cars has been followed during the last five years and the roads which adopted this procedure will undoubtedly benefit from increased earnings and reduced maintenance expense of the new equipment.

In the field of passenger-train cars on Class I carriers, the total ownership is 37,940. About 890 cars, or 2.35 per cent of the equipment, are one to five years old and 18,737 cars, or 49.38 per cent, are over 25 years old. The percentage of cars less than five years old is substantially smaller and the percentage of cars over 25 years old substantially higher than in the case of freight equipment.

Again, reference to the records of individual roads shows that, in most cases, there are more coaches over 25 years old than in any other of the five-year age groups. The status of Pullman equipment is substantially better than that of railroad-owned cars, only 31.02 per cent of Pullman cars being over 25 years old and 12.64 per cent from one to five years old. The total number of Pullman cars is 7,121. Of the 37,940 railroad-owned passenger train cars, 17,940 are coaches; 2,649 combination coaches, 13,281 head-end cars; 523 parlor, lounge, observation; 1,591 diners; 1,785 postal; and 171 miscellaneous. It has been estimated that the railroads will need 3,000 new passenger cars a year for five years after the war to bring the age inventory of this class of equipment cars within reasonable limits and, even more important, elevate the potential serviceability and customer appeal of passenger cars until the railroads will be in a position to meet every modern competitive demand.

Radio Channels For Railroad Service

To establish reasons for allocating radio channels to the railroads for train communication and other needs, a hearing was held in Washington, D. C. (September 13-18) before the Federal Communications Commission. The three commissioners sitting were Paul H. Walker, chairman, Norman S. Case and E. K. Jett. Both railroad and manufacturers' representatives presented testimony. Much of the testimony concerned the relative merits of space radio systems and of the carrier system, which does not require wave channel allotments, but the evidence clearly indicated that the railroads can use both to considerable advantage. The report of Committee No. 7 of the Radio Technical Planning Board, presented by J. F. Niesse, assistant superintendent of telegraph, New York Central, and chairman of the committee, requests 141 channels. This request is based on conditions in the Chicago area where a maximum number of roads converge, and it was explained that the railroads might not require exclusive rights to all these channels and that they were prepared to move from the 150-300 megacycle channels to higher frequencies when technical development made this possible.

If the railroads are to receive channel assignments, it is necessary for them to prove that use by the railroads is in the public interest and there are many demands for space in the radio spectrum.

Unfortunately for the railroads' case, experience with train communication indicates that it is primarily a means for improving railroad operation and it is difficult to prove that it is primarily a safety device. Up to date, its use has been mostly experimental. This means

there is little compiled safety evidence to its credit among railroad operation records and any such evidence must of necessity accumulate slowly, since railroads are so well protected by many safety measures.

It is of course possible to say that end-to-end communication will permit the conductor to advise the engineman of hot journals, dragging equipment and clearance at switches and that it will obviate any need for braking a long freight train from the rear. Its use for notifying dispatchers of derailments, stalled trains and obstructed track is obvious, but most of the safety qualities are intangibles.

Probably the most convincing evidence was presented by J. H. Aydelott, general manager, Chicago, Burlington & Quincy, who said that safety is dependent on orderly operation, and since train communication facilitates orderly operation, it also promotes safety.

Nor is safety the only advantage accruing to the public from the use of train communication systems. The railroads have proved themselves the most valuable form of domestic transportation in time of war and they must be maintained as such for any future emergency. In the post war period, the country must build back and for this purpose it will require the fast, efficient, low cost, mass transportation which only the railroads can supply. Both efficiency and safety are in the public interest.

What Do the Shippers Want?

The depression of the early 1930's brought to light the fact that highway competition had been encroaching on the railway monopoly since the close of World War I. Since then there has been a growing realization among railwaymen that the patron's opinion of every aspect of railway service has become of greater importance than the convenience of the operating department in determining how the service shall be rendered. Temporarily, the importance of this fact has been obscured by the willingness with which railway patrons have conformed to the needs of the railways in matters such as capacity loading and prompt unloading of freight cars. But once the second world war is behind us, the situation will be reversed and again the railways will have to adapt themselves to the shippers' desires.

It is, therefore, a matter to be given serious attention by the railways and private car owners when an association of refrigerator-car users proceeds to study its needs and to formulate them in terms of a specification for the refrigerator car which will best satisfy its members.

Elsewhere in this issue is printed the report of a committee appointed by the United Fresh Fruit & Vegetable Association to consider and report on needed improvements in design to be incorporated in the new refrigerator cars which will be built after wartime restrictions on the use of materials have been removed. The report reflects a highly constructive attitude on the part of this group of shippers. In general, it evidences a recognition of the difference between features which have been in service long enough to have demonstrated their practicability and those which should be left to "further development and trial." It represents a type of cooperation by its customers which the railway industry may well welcome and encourage.

The Same Standards Apply in Both Cases

In setting up the facilities and training the men to maintain and service the 2,000 and more Diesel-electric locomotives that are now in service in this country the railroads were obliged to start from scratch in a field new to them. Over the period of years that they have been maintaining the steam locomotive they have consistently trained themselves in the job of heavy repair work where the machine is run for a period of miles or months, brought into the shop, dismantled and the parts repaired and replaced.

The tolerances in machining and assembling steam locomotive parts have always been generous and the locomotive, when assembled, quite often was found to work more satisfactorily than when tolerances were closer. Therefore when the Diesel entered the railroad field there were two new ideas that came in with it—close tolerances required in the fitting of the Diesel engine and other related parts, and, the principal of parts replacement in repair operations.

These two factors were so foreign to the practices of the past in steam locomotive repair work that it was but natural that, in approaching the question of facilities and organization for Diesel-electric locomotive maintenance, there should be many divisions of thought and opinion. The railroad man, except for a relatively small group concerned with electric locomotives, had only the background of steam experience to influence his thinking. The manufacturers, on the other hand, having had the experience of the development period of Diesel power, knew that the new type of power could not be maintained in the same manner as steam without eventually getting into trouble. With this in mind they have proceeded on the premise that Diesel locomotive maintenance is something entirely foreign to that of steam and that the two problems, and all that is related to them, should be kept separate.

This type of thinking on the part of both the railroad men and the manufacturers has led to some rather distorted ideas and has served to exaggerate the complexity of a railroad problem that, in the final analysis, is not only simple but is less complicated than that of steam locomotive maintenance.

Projects involving millions of dollars are now under way on several railroads for facilities to be used for Diesel maintenance. While these facilities are being made ready for use it might be well for mechanical officers to pause long enough to analyze, very carefully, the reasons why these new facilities for Diesel locomotives are being built. It is because it has been agreed that existing steam facilities are not adequate or are not suited to the maintenance of Diesel power. It might be well to take cognizance of the fact that the major points of difference seem to be a specially trained organization accustomed to working to close tolerances; the adoption of the principle of parts-replacement; a detailed, complete and continuous record of maintenance for each individual locomotive unit; a shop or terminal workplace that is well lighted; a shop space that is clean and can be kept free from dust and dirt and, above all, the desire to do a high-caliber maintenance job.

For many years those who have carried on a continuous campaign for better locomotive maintenance have recognized the need for just those basic things that the roads now feel they must have for a new type of motive power. Actually, except for the internal combustion engine, there is nothing on a Diesel-electric locomotive that some roads have not had experience with for years.

If the above enumerated principles of locomotive maintenance are the things that are needed to be successful in Diesel maintenance, why are they not just as necessary in the maintenance of steam power?

Time Out to Think

During the past four or five years on all railroads the attention and thought of mechanical-department officers has been devoted primarily to immediate problems and their solution. There has been little time for long-range planning. Material supply and the operation of a priority system have hampered discriminating purchases of motive power, rolling stock and shop equipment. Improvements made and gains achieved, generally, have not been a part of an overall program but have resulted incidentally from the elimination of bottlenecks which impeded a railroad's participation in the war effort. The record of the mechanical departments has been excellent under most difficult conditions but those responsible for the achievement have had little time to do more than deal on a day-to-day basis with many of their responsibilities. It appears now that the time has come when they can do more.

There is much talk in Washington and other circles of the reconversion of manufacturing facilities for the production of goods required in a peacetime economy. That this talk is discouraged in many quarters as being anticipatory of an earlier conclusion to the war than the military picture warrants does not alter the fact that the time is approaching when more materials and products will be available to the railroads as purchasers. Among these will be new locomotives and cars, new structural materials and specialties, more shop equipment and tools.

The railroads are not among the industries which must reconvert after the war but they represent one of the greatest potential markets for the products of other industries' peacetime products and for the output of railroad supply and builders' plants which is now being allocated to other uses. It appears, then, that now is the time for responsible mechanical officers to formulate their plans for using what will be available to them and to develop the integrated plans for improvements which have not been possible in any very extensive sense since the outbreak of the war. There is no intention here to give an impression that much such planning is not now going forward but it appears that the detailed and specific studies needed in support of such planning have, in many instances, not been begun. This work takes time and the findings require analysis before broad general objectives are reduced to immediate projects which can be undertaken.

NEW BOOKS

LAYING OUT FOR BOILER MAKERS AND PLATE FABRICATORS. . *Fifth Edition. Revised by George M. Davies, boiler designer. Published by the Simmons-Boardman Publishing Corporation, 30 Church Street, New York 7. 8½ in. by 11¼ in., illustrated. Price, $7.*

In order to make space for heavier plate fabricating layouts and to provide space for a long chapter on locomotive boiler construction and for a new one on Laying Out and Computing Boiler Patches, some sheet-metal problems and a chapter on the Scotch marine boiler have been omitted from the fifth edition of this book. Another new chapter is on Laying Out for Welded Construction. Shop language is used throughout the book and problems are worked out without recourse to higher mathematics. Layout problems by orthographic projection and triangulation are explained with the aid of more than 700 drawings developed by experts. The material is arranged from simple to complex, and the application of principles and methods is made clear by practical problems. The layout of boilers includes not only the materials but all calculations which must be made to determine the size of different parts. Detailed information on proper procedure from start to finish is given on a great variety of sheet-metal and boiler-plate layout work. The book can be used as a text by the beginner for shop or home study, and numerous layout problems are presented for the journeyman. It is completely cross-indexed.

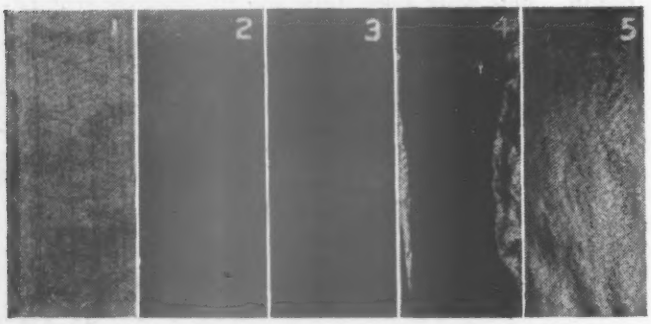
Railway Applications of

High-Temperature Insulation

By Graham Lee Moses*

SILICONE resins permit increased rating of electrical machinery. The railway industry has constantly striven to get higher and higher output from its electrical machinery with a definite trend toward lighter weight equipment. Silicone resins will prove most helpful in accomplishing this objective. Because silicone resins, in combination with inorganic insulation such as mica, asbestos and fibrous glass, have greater thermal endurance than conventional insulation, it is possible to operate electrical machine windings at higher temperatures, thereby in many cases obtaining increased output.

High temperature silicone insulation (referred to as "HTS Insulation") has a thermal endurance of a different order of magnitude than has previously been possible on the windings of electrical machines. Since A. I. E. E. Standards No. 1 clearly states that the basis



(1) Silicone treated glass cloth unaged
(2) Organic varnish treated glass cloth unaged
(3) Silicone treated glass cloth aged 2 hours at 250 deg. C.
(4) Organic varnish treated glass cloth aged 2 hours at 250 deg. C.
(5) Silicone treated glass cloth aged 20 hours at 250 deg. C.

Fig. 1—Silicone varnish and high-grade organic varnish on glass cloth

of temperature limitation is thermal aging of insulation, this is of great significance to the designers and users of electrical railway equipment. There are of course other design considerations which sometimes outweigh temperature limitations. However, frequently it will be found that the improved thermal endurance of HTS insulation can be utilized in any of the following ways:

1. By reduction in size and weight where operating temperature can be increased and where no further reduction in insulation life is acceptable.

2. By increasing the thermal life of insulation where it is desirable to maintain conventional size, weight and temperature limits.

3. By permitting operating in ambient temperatures considerably above those permissible for conventional classes of insulation.

The name "silicone" has been applied to a class of compounds which are semi-inorganic in their nature and bridge the gap between organic and inorganic materials. Their excellent thermal endurance characteristics are due to having an "inorganic backbone" in their molecular structure. They have a silicon-oxygen chain instead of the more readily oxidizable carbon to carbon chain of organic resins. Many molecular structures of silicone materials are possible and they may be "tailor made" for a variety of purposes. Silicone compounds are available as resins, insulating varnishes, lubricating greases, filling compounds and fluids for numerous uses.

The form of silicone varnishes is quite similar to that of organic varnishes with which the electrical industry is familiar. Some silicone varnishes are made with organic solvents and others are of the solventless type. The methods for using them are quite conventional except baking temperature. They are normally applied by impregnation or by dipping according to well established practice. In general, they require baking at 225 deg. C. to 275 deg. C. Since organic materials are seriously damaged at these temperatures, it is imperative that HTS insulation contain little if any such organic materials.

It was soon learned that organic materials were detrimental components of HTS insulation and a family of insulation materials was developed using mica, glass and asbestos in combination with silicone. These parallel conventional Class B insulating materials. Some of the more important HTS insulating materials are listed in Table I which also gives some typical uses for railway apparatus. These HTS insulating materials have been designed so that they are interchangeable mechanically and electrically with standard Class B materials. They can therefore be substituted without sacrifice in space factor or dielectric strength.

The relative effect of thermal aging of glass cloth

Table I—HTS Insulating Materials and Applications

Item	Size	Use
Silicone varnished glass cloth	Continuous rolls 18-in. wide Two thicknesses—.004 in. and .017 in.	Backing for composite insulation
Silicone-glass mica wrapper	Sheets 18 in. by 36 in. Two thicknesses — .008 in. and .010 in.	Coil wrapping
Silicone-glass mica wrapper	Sheets 18 in. by 36 in. by .015 in.	Phase insulating in stators
Silicone varnished glass covered wire	All standard sizes	Magnet and stator winding
Silicone bonded glass-mica tape	All standard widths. Two thicknesses—.0055 in. and .0075 in.	Ground insulation for coils
Silicone filling cement	.....	Plastic filling cement —not rigid
Silicone sized glass tape	Widths up to 1 in. Thicknesses up to .015 in.	Protective outer wrapping for coils
Silicone sized asbestos cloth	Sheets 36 in. by 36 in. by .035 in.	Cushioning material

Table II—Heat Endurance of Silicone Varnish (.002-in. thick film on copper strip) Failure By Elongation* and Crazing†

Aging Temperature	At 14.4 per cent elongation	At 7.2 per cent elongation	At 3.6 per cent elongation	At 1.8 per cent elongation	Craze failure
250 deg. C.	36	55	63	80	85
225 deg. C. (Actual)..	225	290	373	500	590
225 deg. C. (Calculated by 10 deg. rule)....	205	314	360	456	485
200 deg. C. (Actual)..	1,060	1,630	....	....	....
200 deg. C. (Calculated by 10 deg. rule)....	1,160	1,790	....	....	....

* Failure by elongation occurs when the film ruptures while the copper strip is bent around a mandrel.

† Failure by crazing is the point at which fine cracks develop in the film without mechanical deformation.

* Insulation development engineer, Transportation & Generator Engineering Dept., Westinghouse Electric & Mfg. Company, East Pittsburgh, Pa.

varnished with silicone varnish and a high grade organic varnish is shown in Fig. 1. The silicone varnished glass cloth retained its flexibility after 24 hours at 250 deg. C. whereas the Class B material was darkened and embrittled after 2 hours at 250 deg. C. and had lost many of its desirable properties for electrical insulation.

The thermal aging of silicone and conventional varnish films on copper panels is shown graphically in Fig. 2. These data are tabulated in Table II. This also illustrates how well the actual results correlate with the classical "Ten Degree Rule" which presumes that the life is doubled for each drop of 10 deg. C. in temperature.

Since all railway machinery is subjected to the hazards of exposure to humidity and cyclic duty, the question of moisture resistance is of extreme importance. Silicones are outstanding, as they are excellent in this respect. Their precise moisture characteristics are still

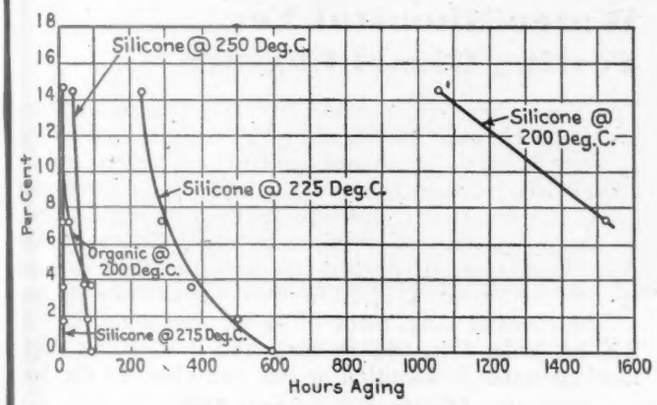


Fig. 2—Comparison by elongation of silicone and organic varnish films (.002-in. thick) after thermal aging

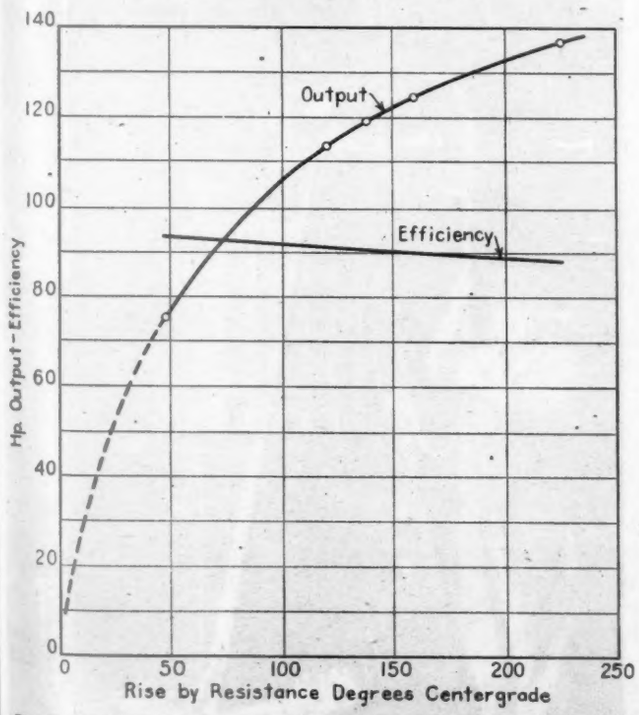


Fig. 3—Curve of temperature tests on an HTS insulated high speed self-ventilated traction motor showing increase in output obtainable at higher operating temperature with constant speed

being evaluated in the laboratory and by service tests, but it can be stated that they are at least as good as the better organic materials and probably considerably better. Certain low viscosity silicone fluids have been used with success as water repellents on porcelain insulators and on paper. They have the peculiar characteristic of preventing water from wetting the surface or forming a continuous film on treated surfaces.

Laboratory tests on materials and motor windings have demonstrated that silicone resins can be operated at least 50 deg. C. above the temperature of conventional Class B insulation with comparable life. It is therefore suggested that where railway apparatus is insulated with HTS insulation, the observable temperature limits be increased 40 deg. C. above those for Class B in A. I. E. E. Standards No. 11 for rotating apparatus and No. 16 for control.

A mining locomotive application was selected where unusually severe service resulted in frequent failure due to roasting of insulation. An armature was rewound in March, 1943, using HTS insulation and has operated without trouble since that time.

A small high-speed traction motor was completely insulated with HTS insulation for test purposes. A series of engineering tests were run which indicated that the output could be increased materially by overloading up to the temperature permissible with HTS insulation. The results of some of these tests are shown in Fig. 3.

A standard PCC street-car motor was insulated with HTS insulation for engineering tests. The motor has been on life test for a considerable period at 290 deg. C. observable temperature on the fields (by resistance). Several similar HTS insulated motors are in production and will soon be in service.

Numerous relay and contactor magnet coils have been insulated with HTS insulation. One case of trouble

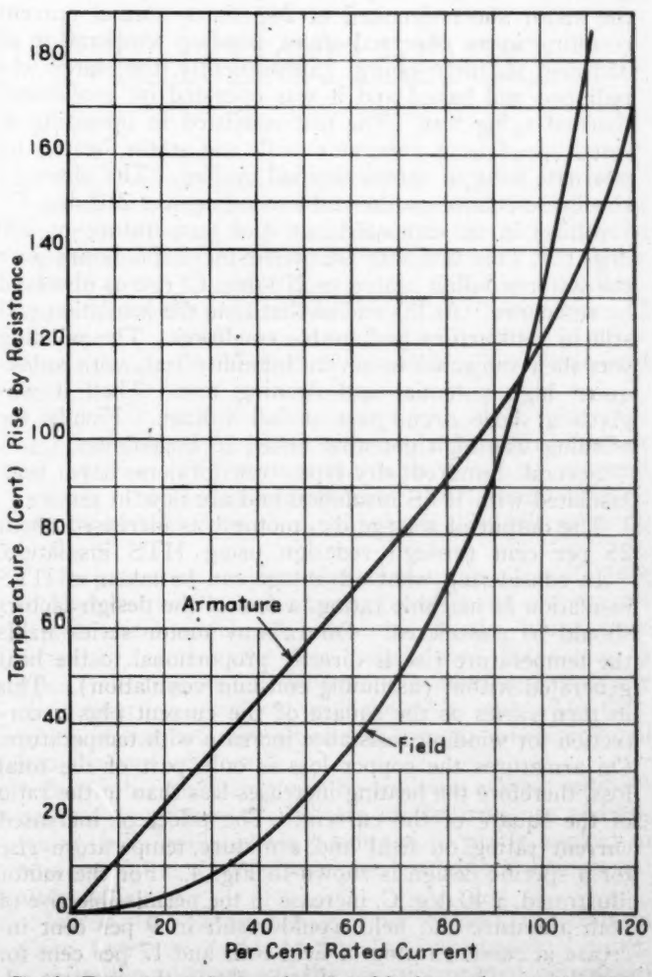


Fig. 4—Temperature rise as a function of load on a d. c. traction motor

was cured where an intermittently rated conventional coil was operated continuously in an excessive ambient resulting in about a year's life. Several hundred HTS coils have been applied to this job with no failures yet reported. Laboratory tests indicate indefinite life for this HTS coil under these adverse conditions.

Early in 1942 a totally-enclosed, fan-cooled, induction motor was wound for 10 hp., using the best available Class B insulating materials and treated with silicone resin varnish. (The normal rating is 3 hp. with Class A insulation and 5 hp. with Class B.) A series of engineering tests was made which included full load temperature run; overload run for 13 hours at 300 deg. C. total operating temperature; and peak overload test during which 500 deg. C. total temperature on the winding was observed by thermocouple. These tests were followed by an accelerated thermal aging test on the insulation during which the motor winding was operated at 210 deg. C. rise by resistance (250 deg. C. hot spot temperature) for 3,376 hours. The motor was dismantled and examined periodically and the winding was subjected to a high humidity test. The test was ended by a bearing failure resulting in damage to the winding.

Other similar totally-enclosed motors built and tested include ratings from 2 to 25 hp.

An alternator was made with HTS insulation throughout the stator. Over 100 stator coils were made of this type for various tests. The stator coil consists of 2 parallel .114 by .162 double glass covered silicone treated wires, 3 turns per coil, 2 coils per slot (approximate section 7/16-in. by 7/8-in. with 9-in. straight part). This generator was given a preliminary temperature test with the stator short circuited at 2¾ times normal current resulting in an observed stator winding temperature of 355 deg. C. for 6 hours. Subsequently, the stator was redipped and baked and it was operated on accelerated thermal aging test. The test consisted in operating at rated speed as a generator with the stator heated on alternate days to obtain thermal cycling. The observed rise by resistance on the stator winding was 210 deg. C., resulting in an estimated hot spot temperature of 250 deg. C. This test was continued for 2,966 hours with the stator winding heated to 210 deg. C. rise as observed by resistance. At the end of that time the insulation was still in satisfactory and usable condition. The winding was then subjected to severe humidity test, with subsequent high potential and running test. Then it was given a short circuit test at full voltage. Finally the winding was high potential tested to breakdown.

Several hundred dry-type transformers have been insulated with HTS insulation and are now in service.

The output of a large d.c. motor was increased about 25 per cent through redesign using HTS insulation.

In considering what advantage can be taken of HTS insulation in machine rating, a few of the design factors should be considered. On railway motor series fields the temperature rise is directly proportional to the heat generated within (assuming constant ventilation). This in turn varies as the square of the current plus a correction for winding resistance increase with temperature. On armatures the copper loss is only part of the total loss, therefore the heating increases less than in the ratio of the square of the current. The effect of increased current rating on field and armature temperature rise for a specific design is shown in Fig. 4. For the motor illustrated, a 40 deg. C. increase in the permissible rise of both armature and field would result in 9 per cent increase in current rating of field coils and 17 per cent for armature. This indicates that to obtain the greatest advantage redesign is required to produce a balance design.

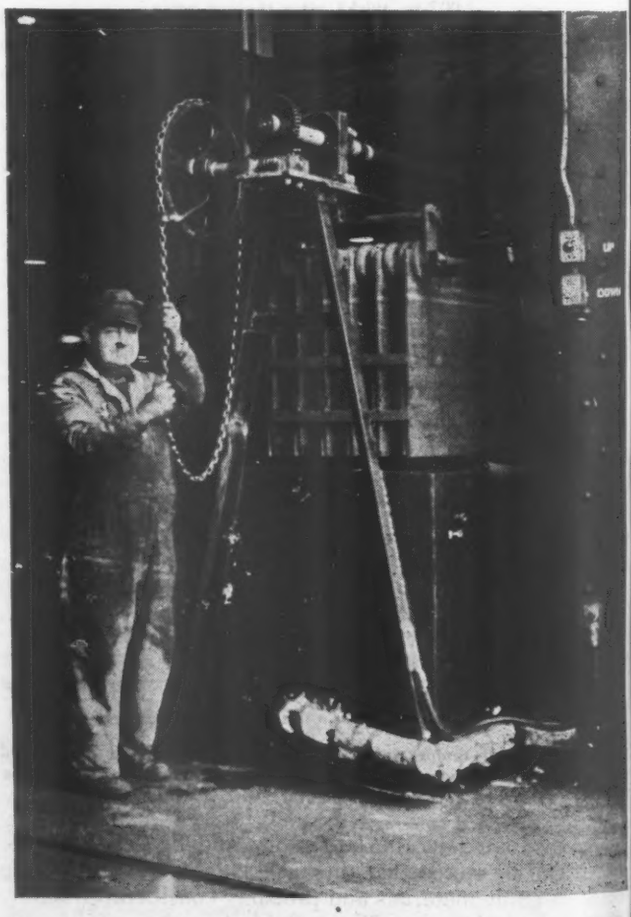
Although previous pioneering by the railway industry has raised temperature standards to the point where returns from further increases are diminishing, it appears desirable to use silicone insulation to obtain these further weight and space reductions or increased ratings on many applications. Furthermore, there are numerous applications where conventional temperature allowances have been used at a sacrifice of insulation life. Where this has resulted in excessive service interruptions and maintenance cost, the situation can be greatly improved through the use of HTS insulation. These new silicone insulations should not be applied indiscriminately, but only after careful analysis of each application, where their use can be justified.

Water Rheostat For Testing Diesel Engines

The New York Central recently installed a water rheostat at its Harmon, N. Y., shop for testing the condition of engines, generators and control equipment on its Diesel-electric locomotives. Based on a design developed by C. C. Whittaker, railway engineering department, Westinghouse Electric & Manufacturing Company, the New York Central rheostat has been modified to meet specific requirements and improved to facilitate its use.

The rheostat tank, made of 3/8-in. steel plate, is 3 ft. 2¾ in. wide, 4 ft. 6¾ in. long and 2 ft. 10 in. high. Cooling water is admitted at one end close to the bot-

(*Continued on page 460*)



The rheostat is placed inside the shop where there is no danger of freezing.

General view of the electrical shop with air brake test stands in the foreground

Traction Motor Maintenance

BENEFITING by 19 years of experience with multiple-unit electric cars, the Illinois Central is able to meet all the electrical requirements of Diesel-electric locomotives with only minor changes in methods and facilities. The question of traction motor maintenance and repair is one now receiving much attention by Diesel operators, and Illinois Central methods as practised in its Burnside shops in Chicago are outlined in the following paragraphs:

The Illinois Central is now operating 33 Diesel-electric locomotives in switching and transfer service and has 6 Diesel-electric units in road service.

Traction motors are normally overhauled at every second wheel-change. The first operation consists of testing both the armature and field with a 1,000-volt Megger tester, both before and after disassembling the motor. Then, after pulling the pinion and taking off the end housing, the armature is removed. Both armature and field coils are given a thorough cleaning, the armature is dipped and baked, the bearings checked, field coils are spray painted with black air-drying insulating paint and brush holders and supports are cleaned and checked. Armatures when dipped on an overhaul are dipped and baked once, twice or even three times, the deciding factor being the amount of varnish the armature will absorb on each dip. After the third time, the armature is void of any air space.

When rewinding is required, no attempt to repair is made if armature requires restacking of its laminations. If the repair is made in the shop, the armature is rewound with slot-size, form-wound coils, using only Class B insulation. After temporary bands are applied, the commutator risers are soldered with a gas-heated soldering iron, supplemented with a gas flame on the surface of the commutator near the riser being soldered. The solder used is either National Electric No. 2A75 or Westinghouse No. 8486-1 solder which is 2 per cent silver, 13 per cent tin, and 85 per cent lead. The flux used is either Westinghouse No. 751 or National No. 2A50 non-acid resin flux.

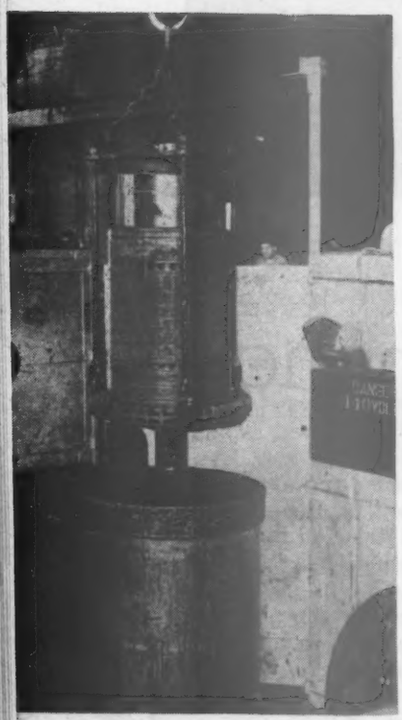
Back-end connections are brazed with silver solder, the heat being supplied by Thermogrip pliers, modified to suit the requirement by the use of thinner jaws and relocated carbons. The brazing transformer is a General Electric unit rated 10,000 watts, single-phase, 220/440 volts, 60 cycles.

The procedure consists of placing a thin sheet of silver solder between the connections, gripping the connections in the pliers which are connected to the transformer secondary, closing the foot switch until the solder is fused, releasing the foot switch and continuing to hold the pliers tight for a moment until the solder sets. The flux, which is supplied with an oil can, consists of commercial borax mixed with water.

Bar-to-bar tests are made by applying a Westinghouse heavy-duty growler to the side of the armature and listening with head phones connected to prods applied to adjacent bars. These tests are made both before and after soldering.

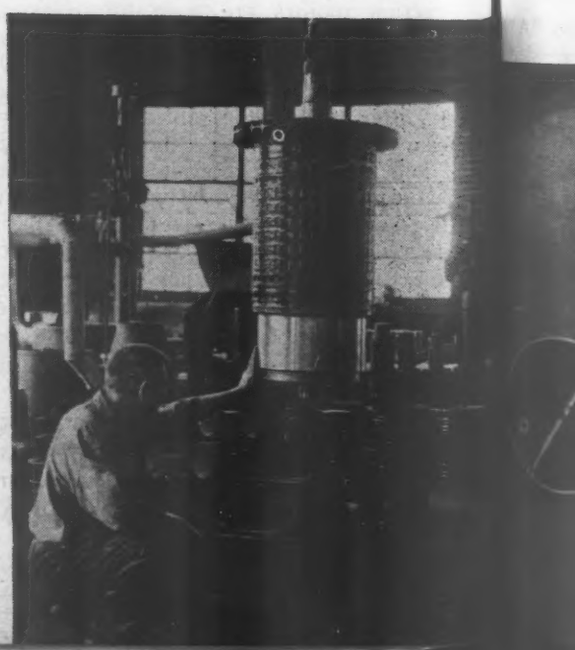
When slot wedges are used for holding the coils in place, they are applied with a light pneumatic hammer.

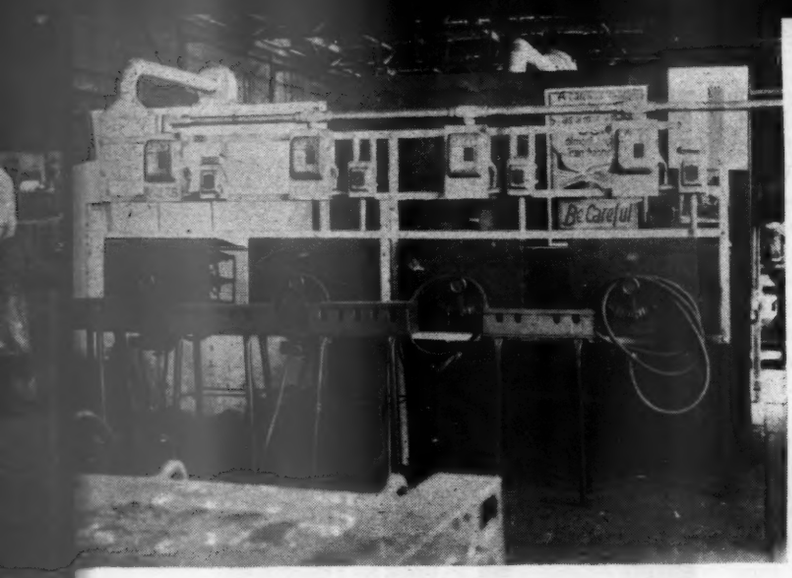
After the soldering and brazing is completed, permanent

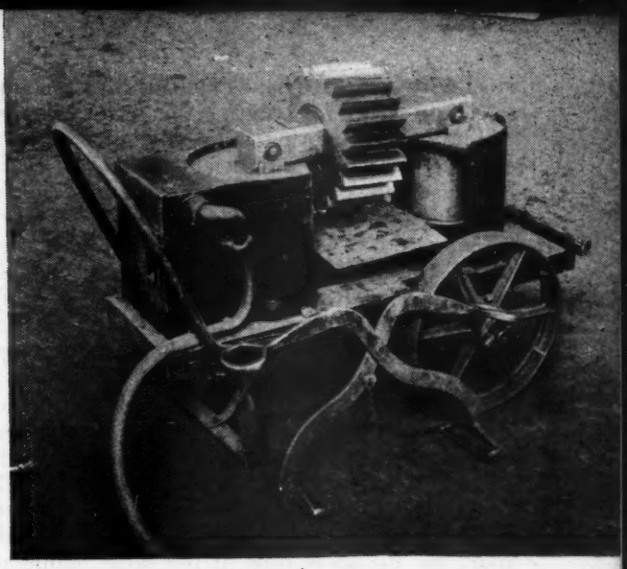


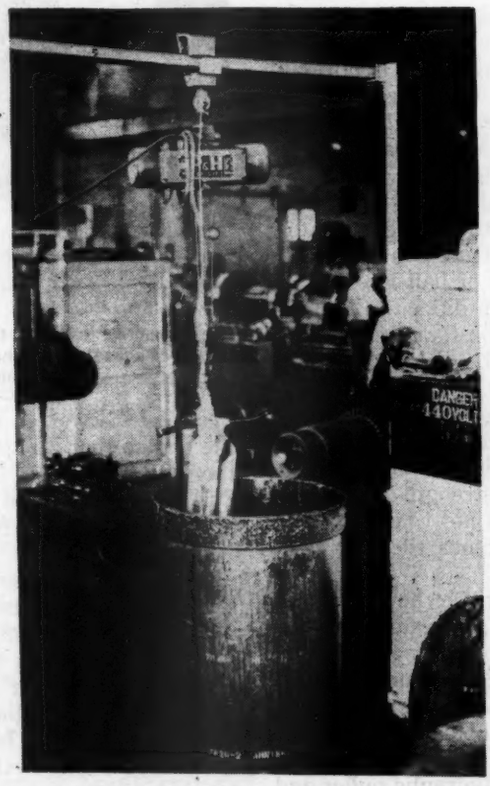
Upper left: The growler induces currents in the armature while the operator listens for shorted coils with test prods and earphones—Right: An armature goes into the baking oven —Center left: Armature dipping cradle and tank—Right: Brazing pliers transformer and foot switch for brazing backend armature connections

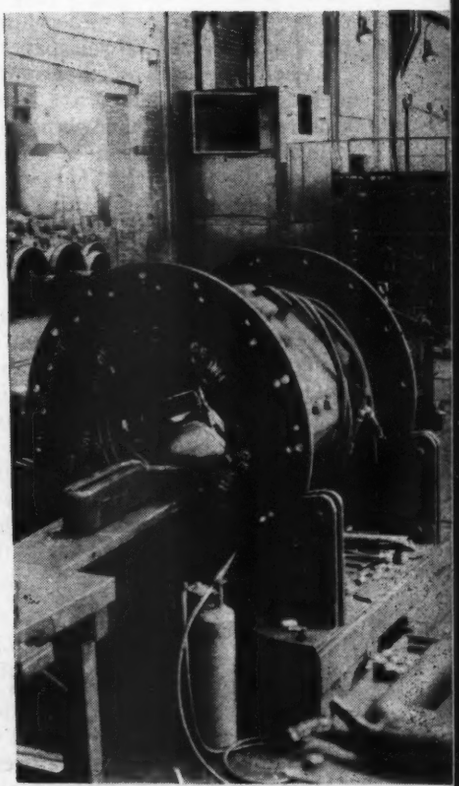
Left: The gas-fired soldering iron is used for soldering commutator risers (supplementary heating flame is not shown)—Right: Cradles and hoisting ring used for handling armatures



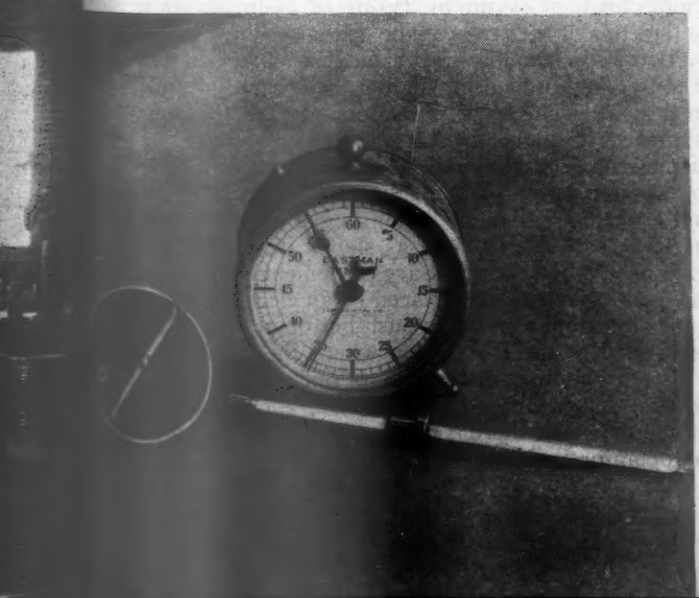


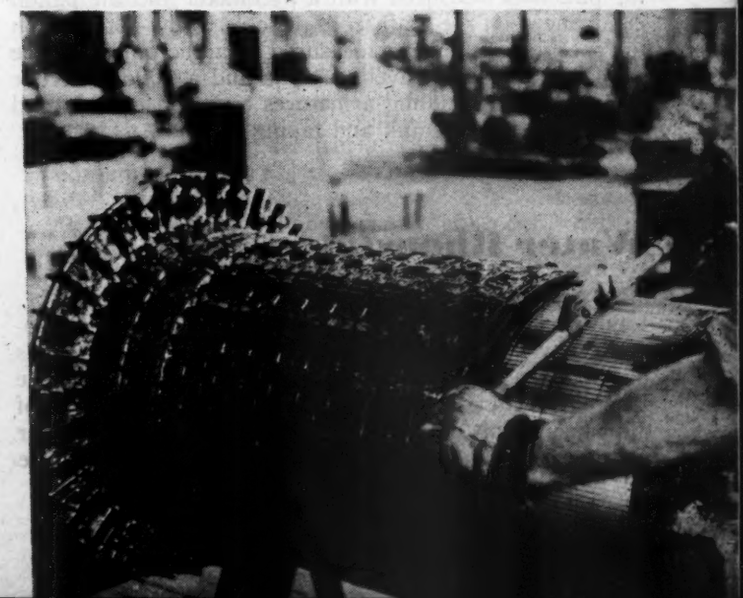






Upper left: Test stands for giving motors running tests Right: Pinion heater and pinion tongs—Center left: Electric hoist and tank for dipping field coils—Right: Positioner for removing and applying field coils (different end plates with properly positioned dowel holes are used for each type of motor frame)—Lower left: Equipment for making insulating varnish viscosity tests (viscosity is checked once a week) — Right: Undercutting a motor commutator





steel-wire armature bands and tin clips are applied, using a friction device for securing the necessary tension.

The front Vee ring is then wound with ⅛-in. glass sleeving and given a sufficient number of coats of Westinghouse No. 672 insulating paint to give the sleeve a smooth glossy finish. Back-end connections are insulated with mica and Westinghouse No. 677 black putty-like compound and then covered with glass tape and a glass fabric hood. Riser connections separated by the No. 677 compound are also covered with glass tape and a glass fabric hood. Band padding is Westinghouse No. 1250 asbestos cloth.

After the winding is completed the commutator is turned and the armature is given a high-potential test at 2,000 volts. The armature is then put into a three-point-suspension cradle and dipped in Westinghouse No. 7826-2 thermoset varnish and baked from 5 to 8 hours at 275 to 300 deg. F. It is allowed to cool, then redipped and baked for the same time at the same temperature; then again allowed to cool and for the third time redipped and baked at 275 to 300 deg. F. for 16 to 18 hours. The final operation consists of undercutting and sanding the commutator with No. 00 sandpaper.

When field coils need reconditioning (this is normally at long intervals) they are removed with the aid of the motor frame positioner shown in one of the illustrations. The outside insulation is stripped to the bare copper, leaving the insulation between turns. New leads are applied and lead connections are insulated with mica and glass tape. A paste of asbestos and air-drying insulating paint is applied to give a smooth outside contour to the first taping which consists of a layer of half-lap 1-in. by .007-in. glass tape. The coils are then dipped in thermoset varnish and baked for 5 hours. The short baking time is necessary, because if the coil is too hard when it is replaced the insulation will be broken.

After the first baking, the coil is given two layers of half-lap, 1-in. by .007-in. fabric-backed mica tape. Over this is applied a layer of 1½-in. half-lap surgical webbing. This is used for mechanical strength and is the only insulation on the motor which is not Class B. The coils are then dipped and baked three times, the short baking period being used each time.

Before the motors are placed in service they are given a shop test, using 220 volts d. c. with a resistance starter. It is run in both directions, the 220 volts being enough to run it at about its normal speed of 1,800 r.p.m., and note is made of commutation, vibration and temperature rise. The shop is now being equipped with a balancing machine for dynamic balancing armatures and wheels.

Motor pinions are removed with a hydraulic puller and applied with an induction heater. The temperature of the pinion is measured with a pyrometer and the pinion is advanced on the shaft from the cold to the hot position the specified distance as measured by a micrometer. The shop has a 10-ton traveling crane and a 200-lb. electric hoist used for handling armatures and field coils in and out of the dipping tank and taping benches.

Water Rheostat

(*Continued from page 456*)

tom through a 1½-in. pipe, the amount of flow being controlled by a valve. The inner end of the inlet extends 4½ in. into the tank and the flow is baffled so that the incoming water is forced to each side along the floor of the tank. The outgoing water overflows over a weir near the top of the end of the tank opposite the inlet. The

The locomotive leads (on the ground) which are coupled to the rheostat leads (overhead) with knuckle-joint connectors can be rolled up and housed when not in use

weir plate is welded to the inside of the tank 2 in. from the end so that its upper edge is 1½ in. below the top of the tank. Made of ¼-in. plate, it is 3 ft. 2 in. wide by 2 ft. 7½ in. high and completely closes off the outlet end of the tank except for 1½ in. at the top. The water overflowing the weir falls into the 2-in. space at the end of the tank and is carried away through a 1½-in. pipe.

The grid-plate assembly is rigid, there being six negative and six positive plates. The two groups are separated from each other by insulating tubes and washers on two through bolts near the upper edges of the plates. The plate dimensions are ⅜ in. by 3 ft. by 2 ft. 4 in. The spacing between the plates is 1¾ in. It was necessary to use twelve plates to fully load a 1,000-hp. engine with tap water as the electrolyte.

The grid hoisting mechanism is supported on two "A" frames made of 2½-in. by 2½-in. by ⅜-in. angles welded to the ends of the tanks. The grid assembly is supported by two ⅜-in. flexible steel cables and is raised and lowered by winding and unwinding these cables on a 2½-in. steel shaft. The shaft is mounted on ball bearings and is turned through a worm wheel having an 8-in. pitch diameter, a 1-in. face and 48 teeth. The worm has a 2½-in. face and a 2-in. pitch diameter. At present the raising and lowering is done by hand, the worm being turned by an 18-in. wheel and chain as shown in one of the illustrations. When the necessary equipment can be obtained, the hand drive will be replaced by an electric motor drive controlled from a portable push-button station which can be carried to the locomotive where the testing is done.

The locomotive under test is out-of-doors where its exhaust fumes are no problem and the water rheostat is indoors where there is no danger of freezing and where the operator is protected from the weather.

The flexible grid leads consist of two 225,000 c.m. cables with terminals brazed to the grids. The fixed end of the negative cable is connected directly to the 762,000 c.m. cable which is run to the locomotive. The positive flexible lead is brought out to a single-pole, single-throw, 1,200-amp., 600-volt, knife switch and the positive 762,000 c.m. cable extends from the switch to the locomotive. The switch, which is mounted in a wood cabinet on one side of the rheostat, serves to isolate the rheostat and is also necessary for the starting of some types of locomotives. The rheostat tank is grounded and in some cases starting cannot be accomplished if there is a ground on the generator leads. The 762,000 c.m. leads to the locomotive are brought out of the building to the test track as shown in one of the illustrations and terminated in two knuckle-joint connectors on a short crossarm just back of the man's head. A second pair of leads fitted with the other half of the knuckle-joint connectors are used to connect to the generators on the locomotive. When these leads are not in use, they are rolled up on the reel shown. The reel is turned with a crank in the housing which has a top and an end door.

Test measurements are made on the locomotive with portable instruments and shunts.

CONSULTING DEPARTMENT

Light-Colored Car Roofs

Should passenger car roofs be finished in light colors to reduce the sun load on air-conditioning systems?

Can you answer the following question? Answers should be addressed: Electrical Editor, *Railway Mechanical Engineer*, 30 Church Street, New York 7.

What are the relative advantages of steel and wooden posts for supporting lights on platforms?

A Question of Operating Advantages vs. Maintenance Costs

This question can be answered "yes" and "no" and there are excellent arguments to support each opinion. From a purely theoretical viewpoint the answer is definitely yes, but there are many factors other than theory to be considered.

To determine the theoretical benefits obtainable with car roof finishes of high reflecting value we need only to refer to the effect of sun load on passenger cars in terms of B. t. u. transmission and the reflection factors of various bare metals and paint pigments of different colors.

A number of tests made several years ago place the heat transmission into a passenger car body from sun load at from 12,000 B.t.u. per hr. to 25,900 B.t.u. per hr. depending upon the angle of the sun rays as related to the plane of the car roof and the roof construction. The average of six cars tested was 17,340 B.t.u. per hr. All of the car roofs were painted black. As all of the tests were made between 11 a.m. and 2 p.m., when the sun was almost directly overhead, it may be assumed that the sun effect upon the sides of the car was negligible due to the very small angle between the sun's rays and the side of the car and that the entire effect of solar radiation was concentrated on the roof.

Assuming the painted roof surface or bare metal roof was clean, the reflecting factors of paint pigments of various colors and some of the more commonly used bare metals are as follows:

Paints	*Per cent*
Gloss white	88
Light gray	63
Aluminum bronze	65
Dark gray	28
Tan	58
Olive green	14
Black	0

Bare Metals	*Per cent*
Aluminum	75 to 85
Chromium	60 to 75
Stainless steel	55 to 65

From this it can be determined that the heat infiltration through the roof of the average car tested could have been reduced from 17,340 B.t.u. per hr. to 2,081 B.t.u. per hr. if the roofs were painted gloss white, and to approximately 6,069 B.t.u. per hr. if painted with aluminum bronze, a saving of 15,259 B.t.u. per hr. with white paint and 11,171 B.t.u. per hr. with aluminum paint. Translated into terms of refrigeration, the increase in effective capacity would be 1.27 tons with white painted roofs or .93 ton with aluminum painted roofs as compared with an identical car with the roof painted black.

Balanced against the increased effective capacity obtainable is the cost in money and man hours necessary to keep the roof paint or surface in condition to utilize its maximum reflecting value. In times like the present the man hours to do this are not available, nor is the terminal time sufficient in most cases to permit the frequent cleaning necessary to accomplish the desired results. From a practical standpoint the answer to the question is "no."

When the theoretical advantages are weighed against the practical difficulty the final answer at least in war time will probably be "no" in a great majority of cases; however, there will be some exceptions where it will be absolutely necessary to utilize the increased effective capacity to provide some degree of comfort for standing passengers.

L. J. Verbarg
Air-Conditioning Engineer
Missouri Pacific

Light Grey Meets Practical Requirements

As heat is transmitted by conduction, convection and radiation, heat losses or heat absorption can accurately be ascertained. The heat transmitted by radiation is affected by the exposed surfaces and varies from the maximum of a perfect black body to a minimum in a pure white.

We know that aluminum paint has good reflecting properties but, unfortunately, so far the durability of aluminum paint has been very unsatisfactory. The Milwaukee road has taken into consideration the desirability of painting passenger car roofs in lighter colors to minimize the radiant heat absorption and has compromised by using a light grey color.

K. F. Nystrom,
Mechanical assistant, Chief Operating Officer, Chicago, Milwaukee, St. Paul & Pacific.

With the Car Foremen and Inspectors

Electric Arc Welding In Railroad Maintenance

*By A. T. Cox, Jr.**

The modern art of electric arc welding has been a source for substantial savings in the railroad maintenance field for a good many years. Recent developments have accented the practicability of utilizing arc welding to its fullest extent to meet wartime shortages in labor and material. The nation's railroads have proved to be one of the leading industries in adapting the electric arc as a major fabricating tool. The rapid strides in railroad maintenance work have been brought about by the application of a practical knowledge of welding so that more of the potentialities of the process can be realized. Combined with the extensive use of welding fixtures and positioners, such knowledge has been instrumental in gaining maximum efficiency and economy in the repair of worn and broken parts and in fabrication of new parts.

Welding in new friction plates on worn brake heads

Since individual applications of electric arc welding in the railroad maintenance field have reached an unprecedented volume, it is not the purpose of this article to attempt to cover all phases of the work as it is being carried out today. The following examples, however, typify hundreds of similar reclamation jobs made possible by welding and illustrate how important this process has become in helping meet emergency conditions.

Among the most significant jobs now being weld-repaired at substantial savings in time, cost and materials, is the reclamation of brake heads, an intricate malleable-iron casting. Arc welding has provided a rapid and economical means of repairing brake heads that have become worn beyond further practical service. The part is first positioned in a special fixture so that the worn portions face upward. Pieces of new stock, pre-cut to fit the worn areas and about ⅛-in. thick, are positioned over the worn-surfaces and clamped down by means of a movable upper fixture section operated by a foot pedal.

The clamping arrangement holds each individual piece of new metal stock firmly while the operator runs an edge weld all around the piece and builds up any adjacent portions of the head that have been chipped or broken away. Shielded arc electrodes of American Welding Society specifications E-6012, especially adaptable to work where fit-up is poor, are used. The welded parts are then ground down to conform to given specifications by means of a power-driven swiveled grinding unit. The operator places the unit in the holding fixture and swings a rotating grinder head back and forth in a fixed arc until faces are ground to the correct contour for a finished brake head. The average repair cost of this brake head job including a 14-cent scrappage value and overhead,

Weld-repaired brake heads must be ground to new head contour

* Vice-president, Engineering, The Lincoln Electric Railway Sales Company, Cleveland, Ohio.

Worn brake head restored for service by arc welding

amounts to 61 cents as compared to 92½ cents per unit cost of a new brake head. Hence a saving of at least 31½ cents per unit is effected.

The fabrication of all-welded spring saddles represents one of the most important conversions from conventional design. Not only has it resulted in notable savings in time but the finished product has proved much more satisfactory and long-lasting than the former cast saddle. The body stock is first cut from flat 1½-in. material, using a portable template-guided flame-cutting machine. Individual cut pieces measure 16 in. by 40 in. with a recessed portion at the center measuring 7 in.

Spring saddles are shown in various stages of completion

in width. The sections are oven-heated to a cherry red and then pre-shaped by bending around a mandrel core. Finish bending is completed with a power hammer.

The spring-seat lugs consist of four pieces of ¾-in. square stock welded all around to the narrow section of the saddle to form a square seat open at each corner. Each lug requires five passes of 5/16-in. electrode of the American Welding Society specification, E-6010. The work is then turned and a tee-shaped lug section of ½-in. thickness is fillet welded along the inside and at the end of each side piece. A ½-in. groove, cut along the top inside edge of each side of the saddle, forms a seat for the tee lugs. Two passes of ¼-in. electrode for mild steel completes the fillets and forms a smooth, dense bead.

Burned-Out Retainer Holes

The A. A. R. Mechanical Division calls attention in a circular letter dated August 10 to difficulty experienced by a member road due to coupler cross draft keys working out, thus permitting the coupler to pull out, often involving a derailment. A number of draft keys had retainer holes burned with a torch and were of such dimensions that they would permit the retainer, even when fitted with a new cotter, to work out of the hole in the key. In one study, 14 draft keys represented eight different equipment ownerships and indicated the extent to which conditions of this kind are found.

The A. A. R. standard for draft keys calls for a 1 9/16-in. diameter hole to accommodate a 1½-in. diameter retainer. The circular letter requests that more careful consideration be given to the maintenance of this A. A. R. standard and thus avoid the unnecessary transportation interference that results when a draft key works out and a coupler is released and falls to the track.

Loading Car Wheels in Box Cars

Dismounted wheels being returned to wheel foundries as scrap are usually loaded in box cars on the Southern. Such loading introduced many problems until the device illustrated was developed by employees of the Spencer, N. C., shop of the company. The wheel loading spot is just outside the wheel shop and, when a car is spotted, wheels are rolled onto a table which is level with the plank platform which is laid only a few inches off the ground. The table onto which the wheels are rolled has side guards to prevent wheels from falling over and is mounted on the piston of an air cylinder placed in the ground. A foot-operated control admits air to the cylinder and actuates the piston which raises the wheel table to the height of the car floor. Piston travel is limited to this height. When the table is at car-floor level a secondary piston raises a plate in the table bed to start the wheel rolling into the car. It is received by a wheel roller and properly positioned in the car.

Loading wheels with this device has proved to be fast, requires a minimum of effort on the part of workmen, and results over a period of years show it to be safe.

Wheels are rolled into a holder for raising to car-floor level

A tilting mechanism on the table bed starts the wheel rolling into the car

In addition, it has eliminated any need for crane handling of wheels or the construction of a special ramp or loading dock.

Decisions of Arbitration Cases

(The Arbitration Committee of the A. A. R. Mechanical Division is called upon to render decisions on a large number of questions and controversies which are submitted from time to time. As these matters are of interest not only to railroad officers but also to car inspectors and others, the Railway Mechanical Engineer will print abstracts of decisions as rendered.)

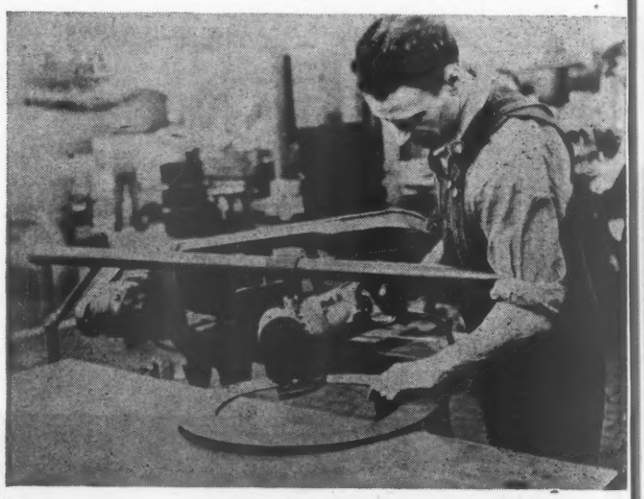
Pay for Actual Time Spent When Owner Is Responsible

Reading Company car 79242, a bulk cement hopper car, was damaged on the line of the Norfolk & Portsmouth Belt Line and a bill for repairs which included an item of 89.9 hours of labor for straightening center sills was rendered. The Reading did not dispute the question of owner's responsibility but it did return the bill several times asking adjustment because of excessive labor charges. The Reading stated that 24 hours would have been a fair and reasonable charge for labor and bring the cost more in line with the cost of performing such work at a major repair point. It also contended that consideration should have been given to performing the work at a shop better equipped than the one where the car was repaired or, failing this, that authority should have been requested to make temporary repairs and forward the car home. The Norfolk & Portsmouth stated that the work had been done by competent and experienced employees and actually required the time billed for; that no other facilities than their own were available and that the car could not have been sent home until repairs were completed; that the work was performed in good faith and in reliance upon the obligation of the Reading to reimburse it; and that the Reading might have been able to effect repairs at a lesser cost was totally immaterial and irrelevant to the issues involved.

On April 25, 1943, the Arbitration Committee ruled that, "The Norfolk & Portsmouth Belt Line states the number of labor hours charged was actually consumed in making the repairs in question. Since charge based on actual time consumed in straightening center sills on ca is proper, the bill should be paid as rendered. Decision Nos. 1459, 1761 and 1772 are parallel." *Case No. 1802 Reading versus Norfolk & Portsmouth Belt Line.*

Swinging Arm Supports Tools

In order to simplify the cutting out of complicated designs from sheet-metal stock, of a maximum thickness o 7/64 in., with a portable power hand shear, a tinsmith at the Fitchburg plant of the General Electric Company, designed and built a swinging arm holding fixture which supports the shear. The fixture is constructed of tubing



The bracket supports the power shears and makes possible more accurate work

welded, and the tool support slides on the top rail. The height is adjusted to correspond with the work. This support makes it much easier for the workman to operate the shear and gives him better control of the work, when cutting complicated designs.

A. A. R. Calls Attention to Loose Maintenance Practices

During the last month, a number of matters of importance bearing on railway car maintenance and use have been called to the attention of members of the A.A.R., Mechanical Division, and private car owners in circular letters signed either by Executive Vice-Chairman V. R. Hawthorne or Secretary A. C. Browning.

In a letter dated September 7, it was stated that, in connection with the billing of refrigerator cars long distances for return loading with serious defects, this matter was considered by the General Committee of the Mechanical Division at a meeting held on September 5 and it is urged that refrigerator car owners take immediate steps to survey their own equipment and remove from service for repairs or disposition bad order cars, or cars of known run-down condition.

Steps should also be taken by all railroads and private car owners to have all refrigerator cars in generally worn-out condition taken out of service. Cars found with sills or other underframe members broken or badly weakened by corrosion, ends and sides broken out, underframe badly

sagged at ends or center, body details worn to the extent that body is out of line, etc., should be reported to car owner for disposition as quickly as possible, preferably by telegraph. The General Committee requests that every effort be made to locate and remove such bad-order refrigerator cars before movement to loading areas.

Inspection and Lubrication of Journal Boxes

In another letter, dated September 11, attention is called to the fact that the A.A.R., Mechanical Inspection Department, is now, and for the last several weeks has been, investigating practices followed by the railroads and private car lines in connection with inspection and lubrication of journal boxes.

The standard packing iron, illustrated on page 91 of Sec. L of the Manual, shows a blade having a total strength of 17 in. properly veed out. A.A.R. inspectors are finding a considerable number of packing irons in service having blade lengths as short as 13 in., badly worn and rounded off on the end. It is impossible to adjust packing properly in the back of the journal box with these defective tools and it is requested that the condition of packing irons in service be checked and. where necessary, defective tools be replaced.

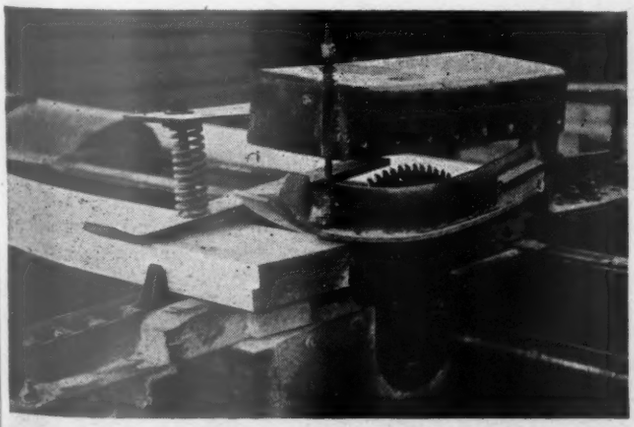
Maintenance of Passenger-Car Trucks

According to a second letter, dated September 11, reports are reaching the A.A.R. of a considerable number of cars in passenger service which are being interchanged between the various roads and that serious delays are occurring due to lack of proper maintenance of the bottom pedestal tie straps.

On many of the cars, it is said that the bolts in these tie straps are not equipped with either lock washers, lock nuts, or cotter keys, and frequently the bolts are too small, clearly indicating that generally this particular detail is not being properly maintained. The Mechanical Division requests that proper application of these fastenings be made at the time of wheel renewals or when any other work requiring removal of the pedestal tie straps is being done.

Safety Guards

Three safety guards developed at two car shops of the Pullman-Standard Car Manufacturing Company are shown in the illustrations. The first is a saw guard

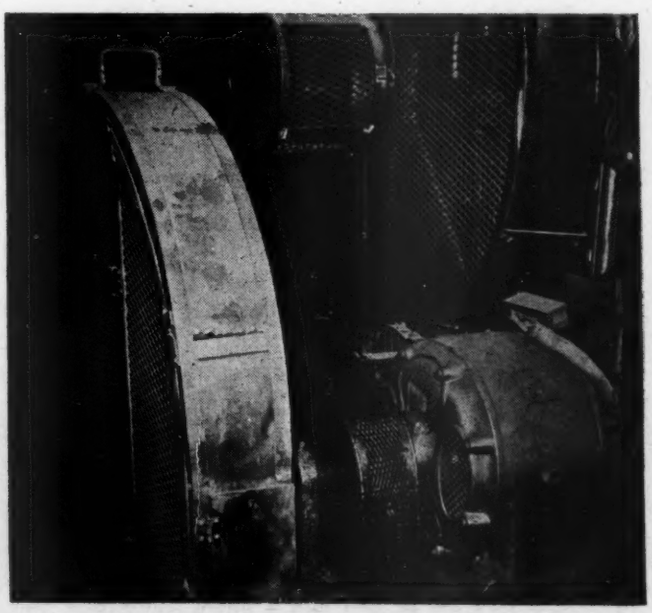


Double-end cut-off saw guarded on one side by flexible hold-down clamp and on the other by hinged guard which rides over the crop end of the lumber

Car shop transfer buggy with simple and inexpensive guard

applied to a double-end cut-off saw in the company's plant at Bessemer, Ala. With this type of machine, injuries to the operator's hands or person are particularly liable to occur unless the machine is guarded with exceptional care.

Referring to one of the illustrations, it will be noted that a flexible hold-down clamp presses the lumber firmly



Guard for individual moving parts of punching machine in a car shop

against the carrier during the sawing operation and guards one side of the saw blade. At the same time, a hinged safety guard, positioned on the other side of the saw blade, rides over the crop end of the lumber and not only prevents any possibility of its flying, but, in either the raised or lowered position guards the cutting edge of the saw against accidental contact with the operator's hand.

The other two safety devices include a transfer-buggy

wheel guard and a punch guard, developed and used at the Butler, Pa., shops. To avoid any chance of a toe or a foot getting under the flanged wheels of a buggy as it traverses the shop rails, the light sheet-metal guard shown in another of the illustrations is used. This guard, made of ¼-in steel plate welded to angle iron corners, is designed to surround the dolly wheel and move about ¼ in. above the rail top, being supported by strong vertical and diagonal braces from the dolly frame. It can be made easily removable by bolt and nut connections so as to be taken off, should the dolly wheels have to be removed.

The punch guard shown in the third illustration is made of expanded metal. It replaced an expanded-metal railing which extended around the entire motor and transmission, the top of which was only a few inches higher than the top of the motor. Because of the large number of new and inexperienced men and women in many shops, it is especially desirable to guard all moving machine parts within possible reach. The new guard covers each moving part separately, thereby permitting access to any part without exposing the others.

I. C. Converts Old Punch in Emergency

The Illinois Central was making heavy repairs to a series of pulpwood cars at its Centralia, Ill., car shops and could not purchase one important item of material, namely the bolster cover plates which, on these cars, have to be flanged and offset near the end. Cover plates of the required size could not be secured already machined from the car builder, so steel was ordered from the steel mills and worked at Centralia shops.

After being sheared to size, the cover plates were inserted one at a time in the air-operated press, shown in

Fig. 1—Face plate and air press used in holding bolster cover plate down while it is being flanged by hand

Fig. 1, and while one car man held a flatter, two helpers used heavy hand hammers to bend over or flange the coverplate ends, one at a time. The amount of physical effort and time involved in this particular job was too great to be justified for production work, even in an emergency.

To meet this condition, F. C. Krietemeyer, a millwright of the I. C. at Centralia, suggested that the old and unused punch, shown in Fig. 2, be reconditioned and

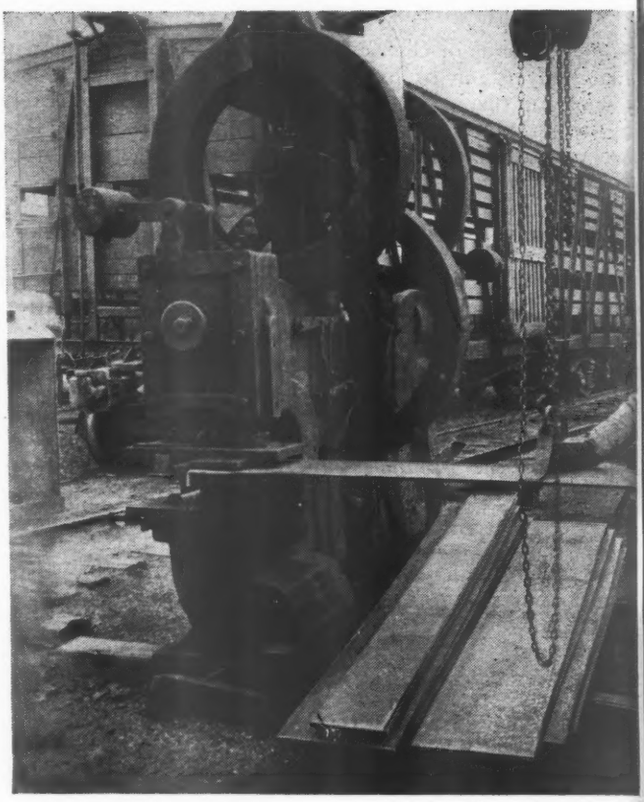


Fig. 2—Old sheet-metal punch converted into press for flanging and offsetting bolster cover plates

converted into a press with suitable dies so that both the flanging and offsetting operations on the cover plates can be performed by power in one operation, each. As a matter of fact this suggestion was the ninth to be advanced by Mr. Krietemeyer who received a $60 award, as announced in the August Illinois Central Employees Magazine.

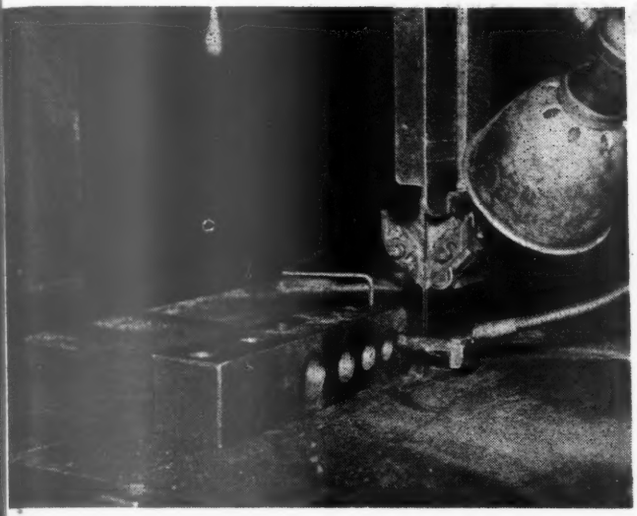
Again referring to Fig. 2, it will be seen that the converted press makes an accurate and straight 90-deg. flange on the end of the cover plate and, not only is this flange made more quickly and easily, but more safely, than by the former method which involved some hazard if the work should slip. The use of another set of dies enables the cover plate to be offset at the desired point in this machine with equal ease.

Time-Saving Car Shop Kinks

Two devices which have demonstrated real merit in saving time on relatively simple operations at a southern car shop are shown in the illustrations.

The first device is used for the quick and convenient clamping of a round stud or bolt while being cut off smooth and square in a metal-cutting band saw. The jig is made of square steel bar stock, drilled with horizontal holes to accommodate round bars of five different sizes and having a countersunk head set-screw tapped through to each hole for clamping the stud or bolt in place.

In operation, the piece to be sawed (and incidentally, it doesn't have to be round or exactly fill the hole) is inserted to the proper depth in the jig and the small handle, illustrated, used to tighten the set screw. The



Jig for holding studs or bolts while being cut off square in band saw

Two-part jig for easy squaring of work on milling-machine table

piece is then held firm and square with the saw blade so that a square, true cut can be made with much less effort on the part of the saw operator.

The second device is a two-bar jig used for the easy squaring and clamping of small car parts being turned out on a production basis by a milling machine or other shop tool. Each of the two bars is machined with a heavy vertical lip at the outer end to position the work and two downward projecting lips which fit in T-slots of the milling machine table and hence keep the two-bar jig and its work square with the table.

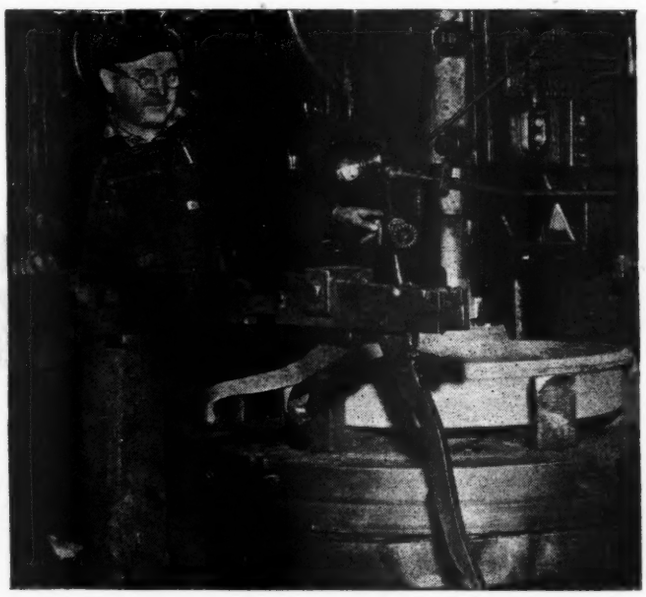
In operation, it is very easy to unclamp one piece of work, or car part, such as that in the illustration, and insert another with every assurance that the part will be square and level with the machine table.

Pullman-Standard Car-Shop Devices

Two devices, developed at the Michigan City, Ind., car shops of the Pullman-Standard Car Manufacturing Company have proved helpful in handling the operations shown in the illustrations.

Referring to the illustration of the car-wheel boring mill, it will be noted that an 8-in. square mirror has been fastened to the frame of the mill at such an elevation and angle that the machine operator can see down into the bore of the wheel and watch both the front and back cuts from a single position in front of the machine. This not only saves time and effort but is a safety feature as well.

The idea in the second illustration consists simply of machining, or cutting away, part of a portable riveting machine at the fork (indicated by the arrow) so as to give necessary clearance for wide-flange side sills. This permits applying rivets required in fabricating the wide-flange side sills with a powerful portable riveter, thus avoiding their driving less securely by hand.



Mirror used to give easy view of back cut on car-wheel boring machine

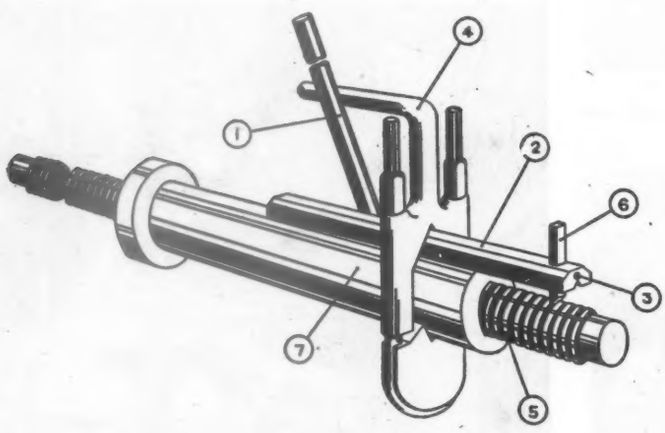
Portable riveter cut away at arrow to permit riveting wide flange side sills

IN THE BACK SHOP AND ENGINEHOUSE

Lead Screws Repairing Machine

An easy method of reconditioning damaged threads on lead screws, deformed either by accident or normal wear, has been devised by a maintenance man at the General Electric Company's Erie, Pa., works.

In this method a lathe dog *4* clamps a V-block *2*—



1—Lever
2—V-block
3—Set screw
4—Lathe dog
5—Lead screw
6—Cutting tool
7—Lead-screw nut

Method of setting up the lead screw cutting tool

machined to hold a cutting tool *6*—to the lead-screw nut *7*. In effect the nut becomes a die with a single-point cutting tool when a tool bit, ground to fit the thread, is inserted in the V-block and locked with a setscrew *3*. The tool will clean burrs and bumps preceding the nut, which is held stationary by a long lever *1*, while the screw *5* is driven by a lathe.

Since few shops are equipped to machine such long pieces, the usual procedure is to file off the deformities. This involves considerably more time than the proposed method of repair, which can sometimes be performed without disassembling the screw.

Applying Valve-Chamber And Cylinder Bushings

A questionnaire was recently sent by *Railway Mechanical Engineer* to about 90 Class I railway locomotive shops, well distributed throughout the country, requesting information about the equipment used and time required for (1) applying valve chamber bushings; (2) applying main steam cylinder bushings; and (3) grinding or lapping cylinder-head joints. Replies were received from 28 shops and the information submitted is summarized in the table accompanying this article, letters being used to designate individual shops which requested that their identities be not disclosed.

An examination of the figures will show, in general, substantially less time and effort required for applying both valve-chamber and cylinder bushings by means of hydraulic devices compared with shop-made, air-operated screw devices and jacks. Similarly, the shop-made air devices of one kind and another used for lapping cylinder heads to make steam-tight joints on the cylinders are less effective and take more time than the commercial electrically operated surface grinder mentioned.

Various types of shop-made devices for applying locomotive bushings have been described from time to time in *Railway Mechanical Engineer* and, in a typical arrangement, include a 3½-in. heat-treated steel screw, 8½ ft. long, which extends through the cylinder and bushing and has a steel block or bar at either end, drawn together usually by a split bronze nut driven through reduction gears from an air motor. It will be noticed that this type of relatively large and heavy device, requiring two men and sometimes a shop crane to handle and operate, is used at 16 of the 28 shops listed.

At two shops, bushings are applied with more or less make-shift equipment and pressures developed by commercial jacks of the Joyce or Duff types. At two other points, shop-made hydraulic devices are employed which are used, as far as is known, only locally at these two shops. At eight of the 28 shops responding to the questionnaire, locomotive bushings are applied by means of the McQuade hydraulic applicator, which consists of a small and light, but powerful, two-cylinder press, capable of developing pressures up to 35 tons through armored-hose connection to a hand-operated oil pump conveniently located on the near-by shop floor, as described in an article in the February, 1938, *Railway Mechanical Engineer*, page 77.

Referring to the first part of the table covering the application of valve-chamber bushings, it will be noted that the time required with the shop-made air-operated devices varies from about 1 hr. to 2½ hr. for two bushings. There are one or two instances, notably shops *R* and *V*, where shorter times are reported, including 5 min. and 30 min., respectively, but a check indicates that neither of these figures includes the time spent in setting up the device. With the hydraulic bushing applicator, the time ranges from 20 min. to 60 min. for two bushings, or roughly one-third of the time required with the screw-type devices and sometimes even a higher proportionate reduction in man-hours may be effected since it is possible in a pinch for one man to set up and operate the applicator without assistance, although a machinist and helper are generally used. Pressures re-

Practice of 28 Locomotive Shops in Applying Locomotive Cylinder and Valve-Chamber Bushings*

Shop	State	Applying valve chamber bushings: Type of machine	Total time	Application pressure, tons	Applying main cylinder bushings: Type of machine	Total time	Application pressure, tons	Grinding cylinder-head joints: Type of machine	Total time
	Ohio	Shop made (air)	1 hr. (1)	5	Shop made (air)	.....	.....	McQuade (elec.)	1 hr. (1)
	Illinois	Shop made (air)	1½ hr. (2)	.....	Shop made (jack)	.....	10	Shop made (air)	2-3 hr. (2)
	Michigan	Shop made (hyd.)	40 min. (1)	.....	Shop made (hyd.)	40 min. (1)	1 per in.	Shop made (air)	2 hr. (1)
	California	Shop made (air)	1 hr. (2)	15	Shop made (air)	30 min.	.....	Shop made (air)	3 hr. (1)
	Kansas	Shop made (hyd.)	30 min. (2)	20	Shop made (hyd.)	48 min.	.....	Shop made (air)	2½ hr. (1)
	New Mexico	Shop made (air)	1 hr. (2)	.....	Shop made (air)	1 hr. (1)	2-step fitted	Shop made (air)	2 hr. (1)
	Georgia	McQuade (hyd.)	.....	.....	McQuade (hyd.)	20 min. (1)	35	McQuade (elec.)	1 hr. (1)
	Georgia	Screw and nut	.....	.....	Screw and nut	.....	.....	Shop made (air)	.....
	Maryland	Shop made (air)	2 hr.	.....	Shop made (air)	3 hr.	2-step fitted	Ground by hand	2½ hr.
	Pennsylvania	Joyce air jack	1 hr. (1)	8	Joyce hand jack	3 hr. (1)	20	McQuade (elec.)	½ hr. (1)
	Massachusetts	McQuade (hyd.)	20 min. (2)	10–25	McQuade (hyd.)	25 min. (1)	10–40	Shop made (air)	.....
	Georgia	Shop made (air)	¾ hr. (1)	.....	Heat	4 hr.	.....	Shop made (air)	2 hr. (1)
	Illinois	Shop made (air)	3 hr. (4)	10	Shop made (air)	.....	.....	Does not grind	.....
	Iowa	Shop made (air)	2½ hr. (2)	.....	Heat	3 hr.	.....	Shop made (air)	30–45 min.
	Kansas	McQuade (hyd.)	30 min. (1)	.....	Duff jack	.....	.....	McQuade (elec.)	1½ hr. (1)
	Colorado	Shop made (air)	45 min. (2)	.....	Shop made (air)	1 hr.	.....	McQuade (elec.)	1 hr. (1)
	Illinois	Shop made (air)	2 hr. (4)	.....	Heat	4 hr.	.....	McQuade (elec.)	¾ hr. (1)
	Michigan	Shop made (air)	5 min.	.....	Shop made (air)	11 min.	1 per in.	Does not grind	.....
	Pennsylvania	McQuade (hyd.)	10–12 min.	30	Heat	20 min.	.....	Shop made	15–30 min.
	Missouri	McQuade (hyd.)	½ hr. (1)	15–20	McQuade (hyd.)	1 hr. (1)	30–35	McQuade (elec.)	1 hr. (1)
	New York	Shop made (air)	25 min. (1)	.....	Heat	8 min. (1)	.....	Shop made (air)	50 min. (1)
	Michigan	Shop made (air)	30 min. (2)	.....	Shop made (air)	30 min. (1)	2-step fitted	Shop made (air)	20 min.
	Washington	Shop made (air)	30 min. (1)	.....	Shop made	1 hr. (1)	.....	Shop made (air)	2 hr. (1)
	Arkansas	Shop made (air)	45 min. (2)	.....	Heat	2½ hr.	.....	Shop made (air)	2 hr. (1)
	Texas	McQuade (hyd.)	2 hr. (4)	15–20	McQuade (hyd.)	2 hr. (2)	12–15	McQuade (elec.)	40–50 min.
1	Nebraska	McQuade (hyd.)	15 min. (1)	30	Shop made (air)	1 hr.	20–35	McQuade (elec.)	35 min. (1)
2	West Virginia	Shop made (air)	30 min. (1)	.....	Heat	4 hr.	.....	Shop made (air)	.....†
3	Illinois	McQuade (hyd.)	45 min. (2)	8	McQuade (hyd.)	1 hr. 10 min.	3-step fitted	McQuade (elec.)	45-70 min. (1)**

* Received in response to questionnaire sent out by the *Railway Mechanical Engineer*.
** Joints also lapped
† Grind back cylinder heads; use copper gasket in front heads.

ported for valve-bushing insertions vary from 5 tons to 30 tons, the latter being generally higher than desirable.

Applying Main Cylinder Bushings

Referring to the center section of the table, covering main cylinder bushings, it will be seen that seven of the 28 shops still adhere to the relatively slow process of heating cylinders to expand them while bushings are inserted. Four hours appears to be about the minimum time which can safely be used in heating cylinders and the much shorter times of 20 min. and 8 min., reported by shops *S* and *U*, respectively, undoubtedly refer to the time required for inserting bushings and do not include the time spent in heating and expanding the cylinders.

Commercial jacks are used at three shops for applying main cylinder bushings. The general lack of efficiency of this arrangement can be judged from the fact that, at shop *J*, it takes 3 hr. to apply one bushing and it is difficult to understand how the shop foreman knows that the pressure developed amounts to 20 tons, as reported, since there is no gage to measure it.

Shop-made air-operated devices are used at nine of the 28 shops and the time varies, as shown in the table, from 60 min. to 3 hr. per bushing, and averages about 90 min. per bushing, discounting the abnormally low times of 11 min. reported at shop *R* and 30 min. each at shops *D* and *V* which plainly do not include the set-up time required with this type of device.

The hydraulic bushing applicators, installed at five of the 28 shops, are used for pressing in main cylinder bushings in times ranging from 20 min. at shop *G* and 25 min. at shop *K* to 1 hr. at shops *T* and *Y*, and 70 min. at shop *Z*. The average time is 45 min. per bushing, or one-half that required with the heavier and more awkward shop-made air-operated devices. It will be noted that cylinder bushings are applied in two-step sizes at shops *F*, *I*, and *V* and three-step sizes at shop *Z3*. The pressures are calculated at about one ton per inch of cylinder diameter and vary from 10 tons to 40 tons.

Making Cylinder-Head Joints Tight

Replies to the questionnaire relating to methods of making cylinder-head joints steam tight are given at the right in the table and show a great predominance of shop-made air-operated devices which partially revolve the cylinder head, or a grinding ring, against the seat on the cylinder, using a grinding compound to remove the high spots and make a tight joint. This type of device is used at 14 of the 28 shops and the abnormally short times of 30 min. and 15 min. quoted for shops *N* and *S*, respectively, obviously do not include set up time. Excluding these two figures, the average time required at the other shops is 1¾ hr. per joint ground with the shop-made tool.

The McQuade electric cylinder-head seat grinder, referred to in the table as being used at 10 shops, consists of a small electrically operated cup grinding wheel which is supported in a balanced arm revolved by hand about its center in a spider suitably fixed in the cylinder, as described in an article in the May, 1942, *Railway Mechanical Engineer*, page 225. The grinding wheel takes a light cut off the cylinder seat just deep enough to true and smooth the joint and the time required to set up the machine and complete this operation varies from 35 min. at shop *Z1* to 90 min. at shop *0*, the average being just under 60 min. per joint ground.

This average of 60 min. may be compared with 1¾ hr. per joint ground with the shop-made tool, but the difference in set-up and operating time does not reflect the full advantage of the electric grinder as it can be used without removing the cylinder studs which is usually necessary with most other devices. To be consistent, the ground seat on the cylinder should be matched with an equally smooth, true and accurate seat on the cylinder head which many shops accomplish by means of a light finishing cut with a tool-post grinder in a boring mill, or large lathe.

In replying to this part of the questionnaire, several shops called attention to the fact that they are welding

back cylinder heads permanently to the cylinders, thus eliminating two joints per locomotive. Shop *Z2* reports lapping its back cylinder heads in the usual manner, but using a round copper gasket in the front heads. Shop *M* states that, with modern accurate machines for facing both the cylinder bushing end and the seat on the cylinder head, it is not necessary to grind or lap either of the seats to secure a tight joint. Shop *Z3* is apparently suspicious of even the ground joint and, in the case of back cylinder heads, not only trues both seats with an electric cup grinder, but subsequently laps the two seats together with a shop-made tool. All 10 of the shops using the electric grinder report that it does a quick accurate job with no subsequent lapping required except in the single instance cited.

Locomotive Boiler Questions and Answers

By George M. Davies

(This department is for the help of those who desire assistance on locomotive boiler problems. Inquiries should bear the name and address of the writer. Anonymous communications will not be considered. The identity of the writer, however, will not be disclosed unless special permission is given to do so. Our readers in the boiler shop are invited to submit their problems for solution.)

Lining Up Firebox Sheets for Welding

Q.—When welding in new firebox side sheets if the thickness of the new plates is found to vary from the thickness of the original plates should the plates be even on the inside or the outside?—F. I. D.

A.—When welding in new firebox side sheets where the thickness of the plates is found to vary and the welding is to be done on the fire side of the sheets, it would be the better practice to line up the sheets evenly on the water side. This eliminates a ridge on the water space side which could be a starting point for corrosion.

Rivet Head Breakage

Q.—What causes the heads of rivets in the longitudinal seams to break off?—R. E. R.

A.—This condition could be caused by the use of defective rivets, improper heating of the rivets at the time of application or by improper application of the longitudinal seam. If the boiler course and the inside and outside welt straps are not absolutely in contact at the time of riveting, excessive riveting pressures must be exerted on the rivets to bring the seams together and hold them, thus putting excessive tension on the rivet heads. To eliminate this condition care should be taken in the fabrication of the boiler to see that the shell course and inside and outside welt strips are properly prepared by grinding to remove all free scale and high spots, the welt strips being accurately formed to fit the contour of the shell. The maximum opening at any point should not exceed .005 in. nor extend over one-half pitch between rivets.

Overcoming Sludge Conditions

Q.—What are the methods employed in removing sludge accumulations at the rear of the mud ring?—F. E. R.

A.—The general practice is to apply washout plugs at the rear corners of the firebox directly over the mud ring for washing the rear and side of the mud ring at periodical intervals. Blowoff cocks applied to the sides of the firebox close to the mud ring are also used.

Where sludge conditions over the rear of the mud ring are severe, a sludge remover is applied. The sludge remover consists of a manually operated blowoff cock applied to the left rear corner of the firebox directly over the mud ring, generally replacing the washout plug. To this blowoff cock is attached a perforated pipe extending across the back of the mud ring to the opposite side with the end of the pipe capped or otherwise closed and supported in position about ½ in. above the mud ring. Three-eighths inch diameter perforated holes are drilled 45 deg. up from the bottom of the pipe with a 6-in. pitch and are staggered so as to alternate in direction from front to back. On some installations the size of the holes is varied with the size increasing uniformly with the distance from the blowoff cock in order to provide the same suction from the right half of the back mud ring as from the left side nearest the blowoff cock.

An operating lever is applied to the blowoff cock so that it can be operated by the fireman from the seat box. The blowoff is piped to a convenient place under the locomotive and a muffler installed so that the blowing can be done at any point desired in operation on the road or in terminals.

Renewing Smokeboxes

Q.—We have considerable trouble with the smokeboxes of our Pacific type locomotives. These engines are fifteen years old. Would this be considered the life of a smokebox? What are the causes of the smokeboxes cracking out from the cylinder cutout? Should the thickness of the new smokeboxes be increased over the original, which were ½ in. thick?—F. E. M.

A.—The average life of a smokebox varies from 12 to 20 years after which time renewals are necessary because of pitting and corrosion, particularly at the bottom of the sheets. Cinder cutting due to the high velocity of forced draft also affects smokebox life. Chemical action leading to corrosion and pitting can be overcome to a great extent by eliminating leaks in smokeboxes and proper cleaning of cinder accumulations.

Cracking out from the cylinder cutout is generally caused by loose cylinder saddle bolts and working of the cylinders. The cylinder saddle bolts should be fitted bolts. When cylinders are renewed the number of saddle bolts should be increased using three rows of bolts in place of the conventional two rows which was the practice in use at the time these locomotives were built. The general practice is to continue the use of ½-in. thick smokebox material applying ¾-in. liners inside the bottom of the smokebox and extending them up the sides to the center line of the boiler. This gives additional support for the cylinder saddle.

Flanged Staybolt Holes

Q.—What are the advantages of using flanged staybolt holes in firebox side sheets for the application of staybolts over the conventional manner of drilling and tapping the side sheets and hammering over the ends of the staybolts?—J. K. S.

A.—Among the advantages claimed for the flanged type of staybolt hole is that added holding power is obtained for the staybolt because, with the flanged hole, ½ in. of thread can be obtained in the sheet, bolts can be set longer and a good head applied by driving into the radius formed by flanging the hole. The fact that the bolt is set in the flanged hole and that the head of the bolt does not project out beyond the surface of the firebox sheet protects the bolt head against fire cutting. Sharp edges

(Continued on next left-hand page)

7 RIGID TESTS FOR CHILLED CAR WHEELS

Test No. 3
CONSTANT PYROMETER CHECKS FOR ACCURATE PROCESSING TEMPERATURE

The Pyrometer Test

- Temperature of molten iron flowing from tapping hole shall be not less than 2600°F.
- Temperature — pouring from reservoir ladle, Range: 2430°F. to 2530°F.
- Association Code of practice also provides controls covering:

  Reservoir ladles; Interruption and Time Standards, Mixing, Flow, Reservoir capacities, Ladles, Pouring, Time in mold.

Pit or wheel temperatures are taken by inserting the thermo-couple through an opening made for the purpose in the pit cover, or in the shell. Temperatures are taken at specified periods of time after pit is filled, to provide a "cooling curve" to insure that the annealing process is under proper control at all times.

One of the most rigorous controls used in manufacturing Chilled Car Wheels by member foundries is the Pyrometer test. This is a temperature test to check every operation in the use of the molten metal from cupola to mold.

Uniformity is guaranteed by constant scientific check of each process by pyrometer readings to ensure compliance with Association standards. Absolute accuracy is assured with the "double-check" method of having all pyrometric control equipment periodically tested, repaired and calibrated at the Association laboratory.

THE 7 RIGID TESTS THAT GUARANTEE UNIFORMITY

1. Chill test block taken at least once in every ten wheels poured.
2. One complete chemical analysis with each heat.
3. *Constant pyrometer checks for accurate processing temperature.*
4. Drop test of finished wheel (A.A.R. Specifications).
5. Thermal test of finished wheel (A.A.R. Specifications).
6. Test for Rotundity.
7. Brinell Hardness test for maximum and minimum chill limits.

3749

ASSOCIATION OF MANUFACTURERS OF CHILLED CAR WHEELS

230 PARK AVENUE, NEW YORK, N. Y. • 445 NORTH SACRAMENTO BOULEVARD, CHICAGO, ILL.

Organized to achieve: Uniform specifications — Uniform inspection — Uniform product

around the staybolt holes are eliminated because the tapped hole starts in the radius of the flanged hole.

Roads using this type of staybolt application are reporting the elimination of defects in firebox side sheets due to plates checking and cracking around the staybolt holes.

Machine Cleaning of Boiler Tubes and Flues

Q.—We are now cleaning tubes and flues by the use of a tube rattler and also by sand blasting. We understand that tubes are being cleaned by the use of a machine. Have you any information concerning one?—D. V.

A.—The machine you have reference to no doubt is the Wheelabrator* which cleans tubes and flues by the use of metal grit. This method removes practically all scale and leaves the tube or flue with a very good finish. In operation the Wheelabrator throws a metal grit by means of a revolving wheel, the metal grit strikes the tube or flue as it is being revolved and fed through the machine. The grit is dropped into the vanes of a vertical wheel and thrown out with sufficient centrifugal force against the flue to cut the scale from the tube or flue. The unit will handle 400 lb. of grit a minute. The size of the grit can be changed to suit the scale conditions; arrangements are also provided to permit changing the speed or rate of travel of the tubes or flue through the machine. The machine has power-driven rolls for feeding the tubes or flues through the cleaning unit and for discharging them on the opposite side after they have been cleaned. An exhaust fan draws all dust and fine scale from the cabinet and through a dust-collecting system where the dust is collected in bags.

Applying Arch Tubes

Q.—What is the best procedure for applying arch tubes to a locomotive boiler?—F. E. D.

A.—The Official Proceedings of the 1941 meeting of the Master Boiler Makers' Association gives the following recommendations for applying arch tubes:

The following method should be followed as closely as possible, that there may be a standard application. Drill a guide hole in the sheet or punch hole, then drill the proper size hole for the tube $\frac{1}{32}$ in. larger than the tube. Have the tube bent by a cold bending machine. If the shops are equipped otherwise, have them bent by heating. In most cases tubes are kept in stock, bent and ready for application, 1 in. longer than required. When the boiler is ready for the tubes place the tubes in the holes, mark the tubes for proper length, remove, cut off the extra material with cutting machine or hack saw. We do not recommend cutting the tubes off with oxyacetylene torch unless the slag accumulation is chipped off after burning.

The tubes then should be properly placed in holes and held straight for the proper setting of the arch brick. Then roll or bead or flare out. Each railroad has a standard practice of beading and belling tools. We recommend that the tubes extend past the sheet ¼ in. for beading, and ⅜ in. for belling. The use of copper ferrules where tube holes become large is good practice, but the thickness of copper should have a limit. We recommend that the radius of arch tubes be given careful consideration. They should enter the sheets at right angle, where possible. Good results are also being obtained where sheets at the holes are built up to ¾ in. in thickness.

* For a description see the February 1943, issue, page 102.

Increasing Tool Life On Stainless Steel Forgings

A method of overcoming tool troubles caused by a combination of scale and the work hardening of stainless steel forgings was evolved recently on a job involving turning and facing operations on supercharger rotor turbines with cemented carbide tipped tools.

When machining this part (see Fig. 1), it was noted

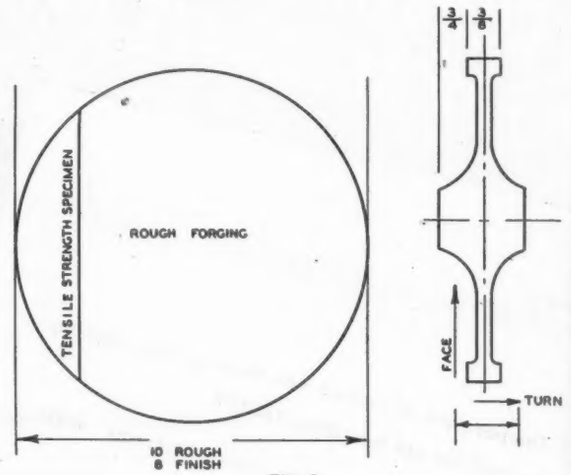


Fig. 1

that failures on tools occurred at any point where the tool was cutting a previously machined surface and also at the scale line. The former trouble was found to be due to the fact that stainless steel of the analysis being used work hardens rapidly and this increase in hardness penetrates to a depth of several thousandths of an inch. Therefore, a feed above 0.008 in. was maintained, which overcame the trouble previously caused by the carbide tipped tool cutting through work hardened stock.

The tool design shown in Fig. 2 was worked out to furnish the added strength and chip breaking qualities

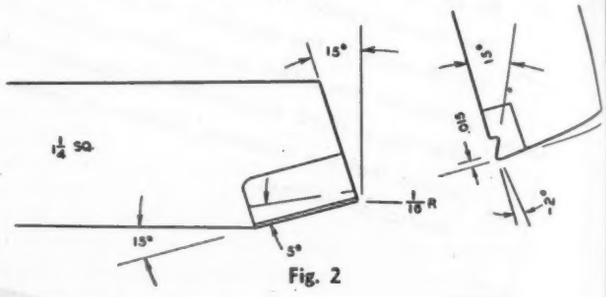


Fig. 2

needed when cutting through the scale on the stainless steel forgings. A negative strength land on the tool reduces the tendency of the material to tear out the tool's cutting edge.

In addition, a reverse angle breaker of from 4-5 deg. prevents the chip from curling back and impinging against the cutting edge at approximately the scale line as it otherwise would do on this particular set-up. In this instance, it was found that the best way to put the breaker in is to grind a regular breaker at 15 deg. positive rake at a reverse angle to the cutting edge. After the breaker is in, a land at from —2 deg. to —3 deg. and 0.015 in. wide is ground on a 6-in. Diamond pedestal grinder.

With the tool illustrated, an average of 10 pieces were faced and turned between grinds, although the part had a Brinell hardness of 280 to 320. The speed was 140-160 surface f. p. m. with a depth of cut of 1½ in.

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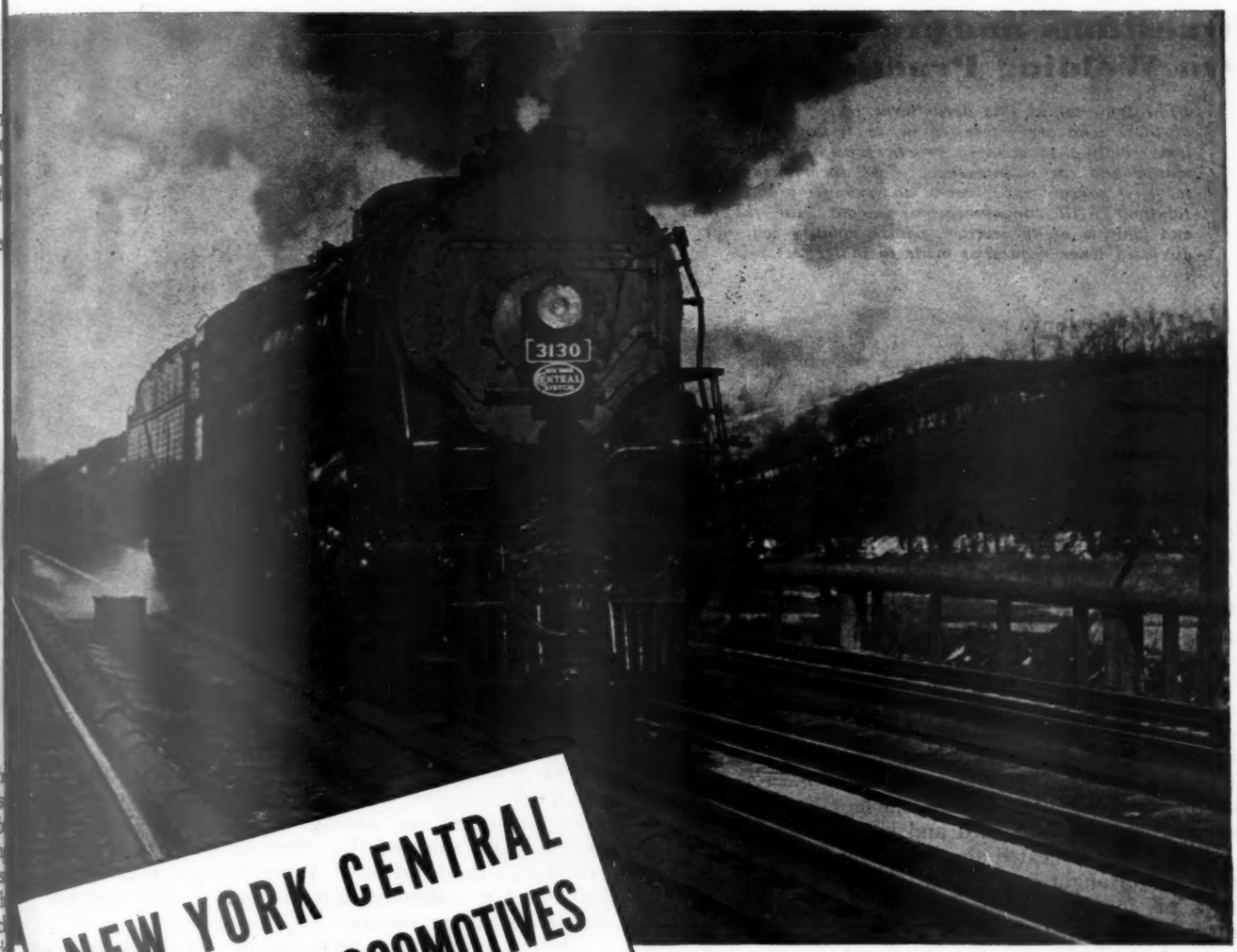


NEW YORK CENTRAL LIMA-BUILT LOCOMOTIVES

Scoop Water at 75 MILES AN HOUR

. . . . into specially designed tender tanks

To eliminate slow-down when taking water is the purpose of the new designs of water scoop developed by the New York Central. Lima is now building tenders incorporating improvements whereby water can be taken safely at 75 miles an hour.

The tender tank is so vented to relieve the air and water pressure produced by the inrush of water from the scoop, that no water spills from the top of the tender. All excess water is discharged on the pavement between the tracks at the water-pan locations.

This overflow equipment has been installed on tenders of Class L-4B 4-8-2 locomotives now in service, and fifty new large-capacity tenders with this arrangement are now being built by Lima for the New York Central.

LIMA LOCOMOTIVE WORKS

LIMA LOCOMOTIVE WORKS INCORPORATED

INCORPORATED, LIMA, OHIO

Questions and Answers On Welding Practices

(The material in this department is for the assistance of those who are interested in, or wish help on problems relating to welding practices as applied to locomotive and car maintenance. The department is open to any person who cares to submit problems for solution. All communications should bear the name and address of the writer, whose identity will not be disclosed when request is made to that effect.)

Surface Hardening

Q.—Are flame hardening and casehardening the same? If not, what is the difference between the two?—M. F. G.

A.—Flame hardening by the oxyacetylene process must be differentiated from casehardening, carburizing, nitriding, or any other practice that involves a chemical change in the surface of the materials. The flame hardening process does not alter the chemical composition. When the process was first introduced, the impression arose that the excess acetylene flame added carbon to the steel, but this is not always true. A strictly neutral oxyacetylene flame is used as a heating medium and the hardness is produced by quenching while the surface of the steel is still above the critical temperature.

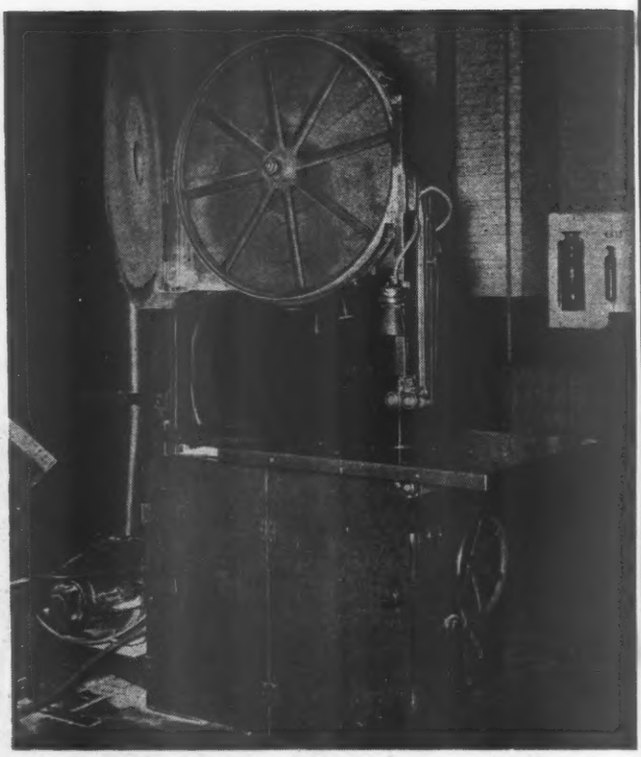
The intensity of the oxyacetylene flame induces heat so rapidly that it penetrates the material only a fraction of an inch. This imparts to the surface of the metal a hardened case which may vary in depth from a mere skin to ¼ in., depending on the composition of the base metal, on the operating methods used, the length of heating time, the quenching media used and similar factors.

When steel is heated above its upper critical point, the carbon is brought into a state of solid solution with the iron, or, in other words, carbon is diffused uniformly throughout the mass. If the heated mass is then allowed to cool gradually to room temperature, the carbon is precipitated to the grain boundaries, producing a coarsely-grained structure which is relatively soft.

When the cooling is rapid or sudden, as in the flame hardening process, the constituents have not time to come out of solution and the structure that results from the heating is stabilized and arrested. Thus, a hard or martenistic structure is formed at the surface. There is no sudden change in chemical analysis and also no sharp line of demarcation between the hardened zone and the softer core such as is found in casehardened work. This fact is due to the balancing or tempering action of the metal beneath the hardened surface, which produces a gradual transition from the hard martenistic structure at the surface to troostite, then sorbite, and finally to the original unaffected structure of the core. The increased toughness resulting from this physical condition combined with the higher Brinell hardness, accounts for the successful wear resistance of parts that have been given this treatment. The hardness zone produced is, at least, two or three times the depth of that obtained by carburizing and will not spall, check or crack with impact, vibration or deformation.

Safety Guard For Band Saw

A novel safety appliance has been installed on an Oliver band saw at the carpenter shop of the Harmon electric shops of the New York Central which was designed by the carpenter-shop foreman, David Cleveland.

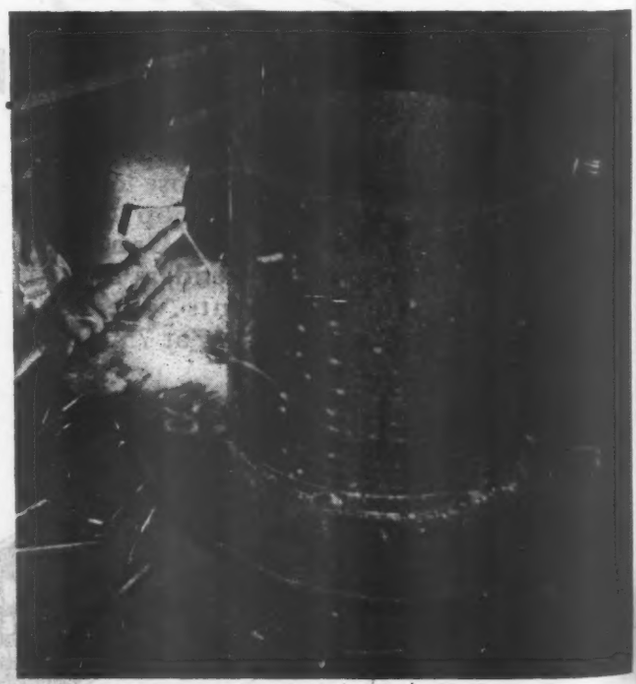


Safety guards for bandsaw wheel and blade protect men from injury

The revolving wheel which carries the band saw is ordinarily exposed, causing a dangerous condition to the operator if the saw breaks. A one-piece metal cover encases both sides of the wheel and is hinged for easy removal of the band saw. When the saw is in operation this feature eliminates any danger to the operator if sudden breakage occurs.

Sliding guides have been installed in the metal frame at the location where the band saw enters the saw table. There is also a safety glass feature on the saw guide to enable the operator to determine if the band saw is riding the center of the wheel while in operation.

* * *



Fabricating smokestacks in the welding shop

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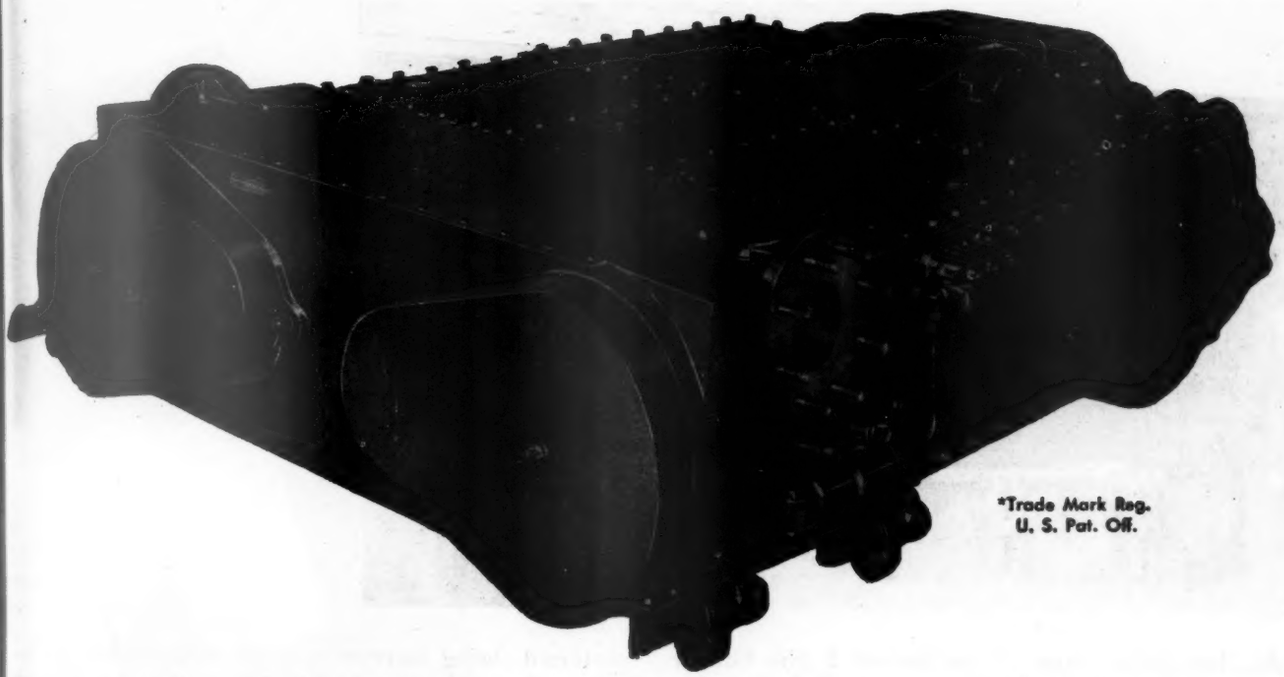
The TYPE "E" BOOSTER*



*Trade Mark Reg.
U. S. Pat. Off.

A new Booster to meet new conditions

For today's increasingly exacting demands the Franklin Railway Supply Company, Inc., has developed a new Booster, which meets the requirements brought about by higher boiler pressures and new factors in current steam locomotive operation.

The short cut-off, the cast steel cylinders with large steam and exhaust passages, and a new design of ball joint, with self-adjusting packing, secure maximum efficiency and economy in the use of steam.

A special starting device enables the Booster to develop maximum starting effort, and a new air control permits engagement at higher speed. Other outstanding features include dynamic balancing and a roller bearing crank shaft, securely housed in the engine bed.

Every element in its construction is designed to increase the operating effectiveness of the Booster.

FRANKLIN RAILWAY SUPPLY COMPANY, INC.
NEW YORK • CHICAGO
In Canada: FRANKLIN RAILWAY SUPPLY COMPANY, LIMITED, MONTREAL

Water-Cooled Furnace Door

The difficulty in maintaining sheet-metal furnace doors subject to high temperatures in serviceable condition, even when the doors are backed with fire brick, is well known to blacksmith and boiler shop supervisors. With high-operating temperatures in the furnace, it is almost impossible to keep the steel doors from warping.

To meet this condition, a water-cooled door has been developed and installed on a large furnace at the Denver, Colo., locomotive shops of the Denver & Rio Grande Western, as shown in the illustration. This door has been in service for a considerable period of time and has demonstrated the practicability of its construction by remaining straight and easily operable without any maintenance expense since the original installation.

Water-cooled furnace door installed at the Denver, Col., locomotive shop of the Denver & Rio Grande Western

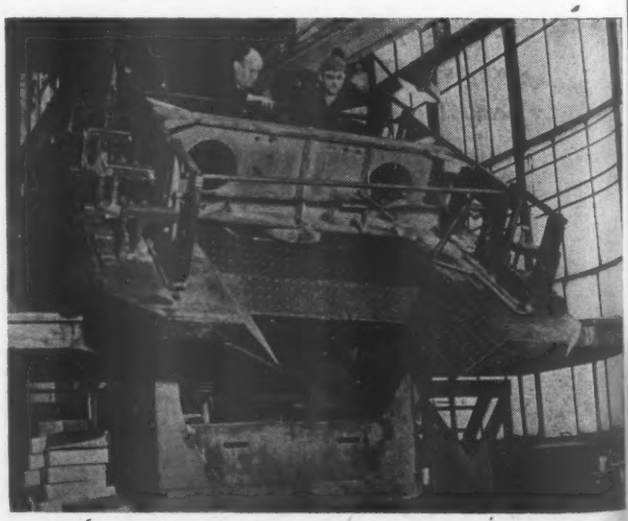
Referring to the illustration, it will be noted that the water-cooled door has been applied to a large furnace, which had previously been giving trouble. The door on this furnace is 10 ft. 5 in. long by 2 ft. 9 in. high. It is made of two ⅜-in. steel plates with a 3½-in. water space between them. These plates are held in fixed relation to each other by 1-in. hollow staybolts applied in rows about 8 in. apart horizontally and 8⅜ in. apart vertically. The top, bottom and ends of the door are ½-in. by 3½-in. steel strips welded in place to give water-tight joints.

The door is guided in steel ways at either side of the furnace so that it can slide vertically, the operation of opening and closing being effected by means of chain connection over two pulleys to a 10-in. vertical air hoist (not shown) at the right. The air-operating valve which controls the door opening is located at the left.

One of the necessary features of this door is, of course, an easy means of keeping water in it. At the right side of the door, a 1¼-in. pipe is inserted through the top plate into the water space and reaches within 2 in. of the bottom plate. This filler pipe, secured in place by a tight fit in the top plate, to which it is also welded, telescopes a small stationary ¾-in. water supply pipe, shown at the right in the illustration. In the closed position of the furnace door, this stationary supply pipe just enters the filler pipe. As the door is raised, the stationary pipe simply projects deeper into the filler pipe until, in the upper door position, its end is also within about 2 in. of the bottom of the water space. This construction assures the delivery of all water to the bottom of the door.

A ½-in. globe valve and drain pipe threaded into the furnace door at the left side near the bottom, affords means for draining the door or controlling the flow of water through it in order, under extreme conditions, to maintain the desired minimum water and door temperature. A 1¼-in. telescopic overflow pipe is also installed at the left side of the door to take care of any overflow and drain it to the sewer. In installation, this overflow pipe is just the reverse of the supply pipe previously mentioned, being inserted through and welded to the bottom plate of the furnace door and reaching up through the water space almost to the top of the door which must be kept as nearly as possible full of water. The 1¼-in. drain pipe has a 29-in. extension which telescopes or moves up and down in a vertical section of 4½-in. tubing connected to the sewer lines.

* * *



Non-skid footplates have been set at different angles around this welding positioner to give the welder a level floor from which to work regardless of the tilt of the table—It is used in welding trucks for Diesel locomotives made by the General Electric Company

(*Turn to next left-hand page*)

NEW DEVICES

Metal Spray Gun

Metallizing Engineering Company, 38-14 Thirtieth street, Long Island City 1, N. Y., has developed the Metco type 3E metallizing gun, especially engineered for the high-speed production spraying of low melting

Metallizing gun which has a high deposit rate when used with a number of metals with low melting points

point metals. Rates of deposition, in lb. per hr., include: zinc, 40; tin, 70; lead, 110; solder, 90; babbit, 75.

Regardless of the type of wire employed, no gear changes are necessary to achieve these high speeds. Any spraying speed within the prescribed ranges is automatically obtained, and maintained by a controlled power unit built into the gun. Air-pressure fluctuations do not affect its operating efficiency.

In common with other Metco metallizing guns, the type 3E is equipped with a universal gas head which allows the tools to be operated on any commercial gas, in conjunction with oxygen and compressed air. Owners of Metco type E or 2E guns may have their present equipment converted to a type 3E. Or, the type 3E may be converted back to the standard type.

Storage Type Flashlight Battery

A rechargeable wet flashlight battery for industrial use built on the principle of the automobile wet storage battery, especially valuable for operations where long continued and steady usage of flashlights is necessary, is announced by The B. F. Goodrich Company, Akron, Ohio.

The company recommends the use of the wet storage batteries where dry batteries require replacements more than once every two weeks. A freshly charged wet battery will give about three hours of constant light. Batteries can be used in the standard three or five cell dry battery case with the use of spacer plugs. The batteries carry a six months' guarantee and batteries which have been in service 18 months are reported as still being in good condition.

The battery requires a 1.9-volt, .6-amp. type Mazda lamp instead of the 300-mil lamp used with dry batteries.

Boring and Milling Machine

A combination boring and milling machine designed and built for special production jobs on which there is a certain amount of boring and turning and on which in the same set-up pads or slots must be milled has been placed on the market by the Cincinnati Planer Company, Cincinnati, Ohio.

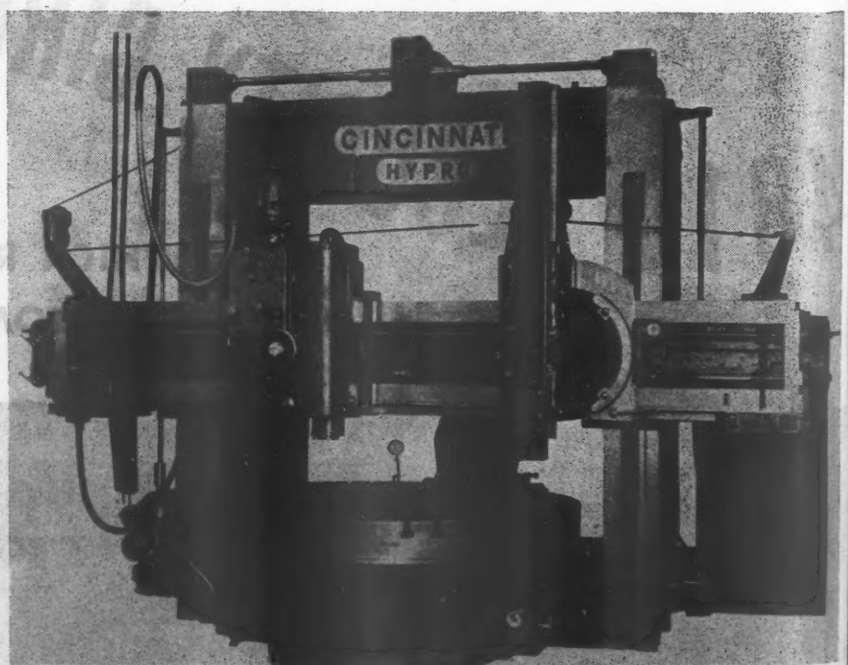
The bed is of one-piece construction and heavily ribbed. The transmission is fully anti-friction and all gears are hardened. Flat table tracks are bolted to the bed and the table is centralized and given radial support by a large anti-friction bearing mounted in the center of the table. This bearing is large in diameter and preloaded to allow maximum efficiency. The table and bed tracks are ample in size and automatically lubricated to stand the maximum pressures of high-speed boring, turning and milling.

There are 16 speeds in geometric progression to the table ranging from 1 to 30 revolutions per minute. A low horsepower motor drives through a worm-drive box providing milling feeds from 2 in. per min. to 80 in. per min. The same transmission is utilized in both table drives. Filtered lubrication between the bed and table tracks is provided by an individual motor-driven pump. A pressure switch is also provided so that if, for any reason, there should be a pump failure the main motor would automatically stop. The pressure switch is set so that a minimum of three pounds will stop the machine. This is an important feature because it insures constant-pressure lubrication to the table track at all times when in operation.

The table is graduated in degrees and has a convenient fine-feed hand adjustment located at the operator's normal position. A convenient and positive locking device is provided to the table for cross milling. The table lock is also electrically interlocked with the feed and drive motors so that the table cannot be moved while in a locked position.

Pyramid type housings are used and are of box-type construction and well ribbed. This type housing also provides a sheath for the individual ram counterweights. The right-hand housing is arranged for a side head and has a heavy vertical rib running almost the full length which is machined to fit the side head. All twisting strains set up in the machine while doing side head turning are equally distributed over the wide-face pyramid housing.

The rail is of Hypro design having a deep box-arch back, a solid narrow guide at the bottom and supplementary bearing at the top. This gives added insurance against tilting of the heads while doing heavy cross



Combination boring and milling machine

feeding and affords more accuracy. Saddles are provided with a spring-loaded roller bearing at the top which helps carry the head weight and makes for more ease of operation. Precision adjustment handles are provided with graduated collars and can be positioned to suit the operator's convenience. A one-piece conical-type square-locked swivel is used on the boring head. The conical-type swivel helps distribute the twisting strains inherent in boring and turning over the entire saddle area. The swivel has the support of the extended saddle and also has an extra long clamping arm.

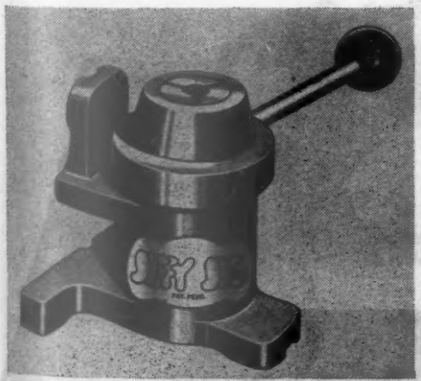
An individual feed and traverse box is provided for each head. The feed and traverse boxes are fully anti-friction and lubrication is provided by means of a pump built into the box. Safety clutches are built into each end of the rail and loaded to take maximum horsepower.

The milling head cross feed is obtained through an entirely separate feed unit mounted on the left-hand housing. Traverse is obtained through this same box. Cross feeds to the milling head range from ½ in. to 8 in. per min. The same selector-box feed and traverse is used for both the milling and the boring head so that there will be no confusion on the part of the operator when changing from turning and boring to milling.

Gearing in the milling head is of hardened alloy steel. All gears are mounted on large diameter multiple splined shafts. The quill is manually operated and has a 10-in. down feed. The complete head, gearing and bearings are lubricated through a pump unit built into the head. There are 12 speeds in the head and they range from 21 to 377 r.p.m. An electrically controlled elevating mechanism is mounted on the extra depth box arch, and is completely independent of the balance of the machine.

Machine Chuck

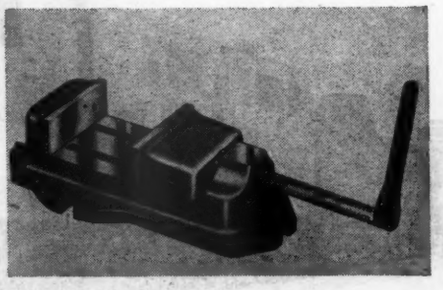
A lever-operated chuck with a capacity for stock ranging from 1/16 in. to 1 in. of section has been developed by the Monarch Governor Company, 1832 West Bethune, Detroit, Mich. It is readily adapted to various machine tools for drilling, milling, boring, grinding, etc., and can be set up in either the horizontal or vertical position. It has been designed to provide ample chip clearance and when the chuck is either open or closed, the collet has absolute zero axial movement and positive axial dimension control. This Jiffy jig consists essentially of three parts; a cap, base, and an operating lever, the taper on the cap conforming to that of the collet. With the proper sized collet in place, the cap is screwed down on the base until the collet opens and closes as desired. The operating lever is then screwed into a convenient location and the jig is ready to use.



Work pieces are held firmly in this lever-operated chuck

Heavy-Duty Vise

The Jenkins Bar-Lok is the trade name for a fast-locking heavy-duty vise that has been developed by the Mechanics Engineering Company, Jackson, Mich. The vise is set



Vise which locks with a quarter turn of the handle

and released by means of a Bar-Lok push-pull pressure unit. This has a positive locking contact at four points and will develop pressure up to 20,000 lb. A quarter turn of the handle locks and releases the vise.

The Bar-Lok vise is precision built for heavy-duty, especially around milling machines and drill presses and wherever severe vibration might affect holding. The vise is built in one size with a 4-in. opening.

Motive Power Storage Battery

The Electric Storage Battery Company, Philadelphia, Pa., has made available what is called the Exide-Powerclad battery. This battery supplements the production of Exide-Ironclads to relieve shortages. The manufacturer states that it meets the most exacting requirements encountered in motive power service and that it is the result of 12 years of research devoted to developing a specific battery for motive power requirements.

The positive plate is completely enclosed by a slotted polystyrene retainer. In combination with the separators, it assures effective retention of the active material and allows rapid diffusion of the electrolyte. This, it is claimed, assures long life of the battery.

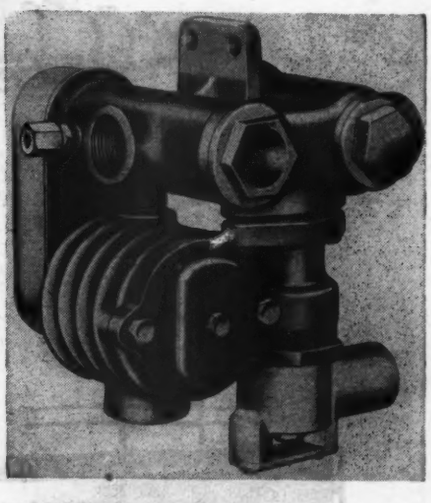
The battery is designed to combine maximum capacity in minimum space consistent with the requirement of long life expectancy to assure economical operation.

Car Heat Regulator

The Vapor Car Heating Company, Chicago, has developed a unit which combines the Vapor regulator with a constant-pressure valve and overload by-pass control.

This Vapor regulator is designed with simple inlet and outlet connections so that it also is considered as a unit part which can be removed from a car and replaced in a few minutes time. Thus, all inspection and maintenance work on it can be done on a simple test rack by experienced personnel in a manner similar to the practice long established for air-brake equipment. This regulator has the economy diaphragm feature in it which insures the elimination of all steam waste. The diaphragm operating on the difference in temperature between condensate and steam controls the steam admission from the trainline through a stainless steel and silichrome valve and seat in the regulator head. All parts of this regulator have had hundreds of car applications and the parts are now grouped into a single unit for ease of operation, inspection, etc.

This unit can be mounted or easily removed from a passenger car as a complete unit for inspection or repair. A simple clamping arrangement is provided which securely holds the regulator to the car structure, and the design is such that steam pipes and electrical connections can be quickly applied or removed.



Single unit designed to incorporate vapor regulation with a constant-pressure reducing valve and overload by-pass control

Plastic Insulating Tape

An insulating tape called Fibron which is claimed to be suitable for many different applications has been announced by the Irvington Varnish & Insulator Company, Irvington, N. J. Made from Vinylite resin and a product of the Carbide & Carbon Chemicals Corporation, it is heat-sealing and flame resistant. Its tensile strength is 1,700 lb. per sq. in. and dielectric strength

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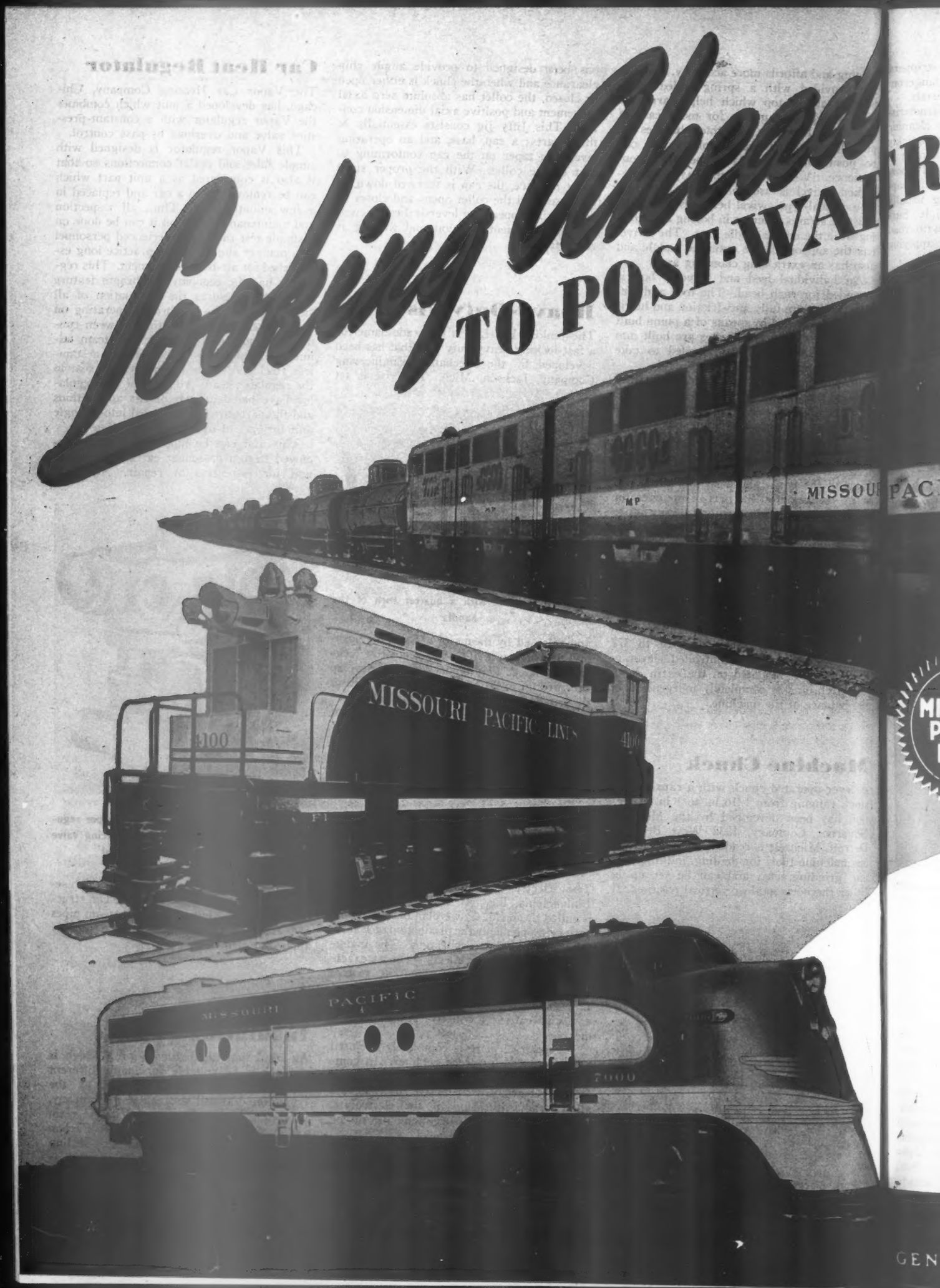
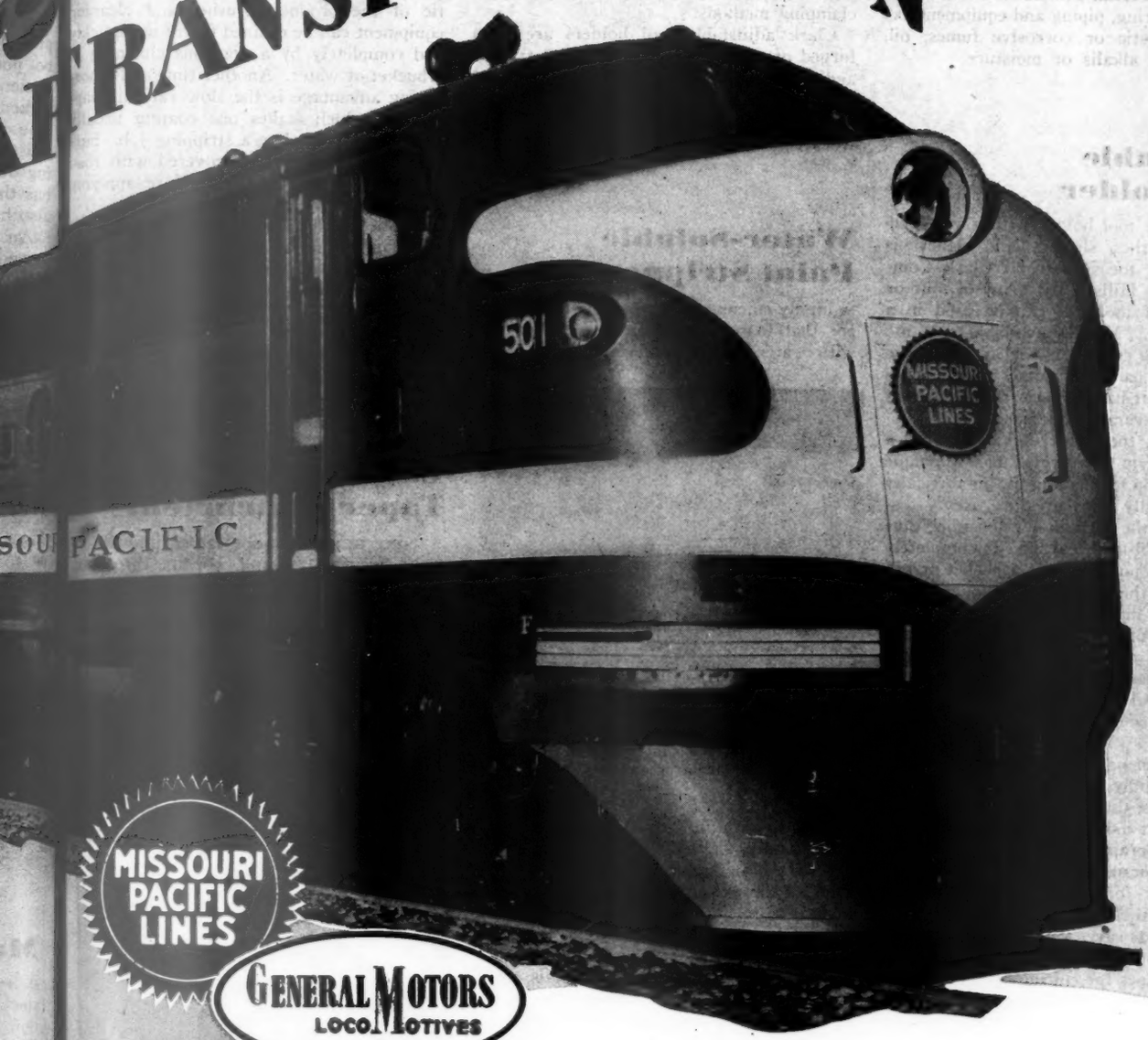

Looking Ahead
TO POST-WAR
MISSOURI PACIFIC LINES
4100
MISSOURI PACIFIC
2000

TRANSPORTATION



MISSOURI PACIFIC LINES

GENERAL MOTORS LOCOMOTIVES

Right from the start, the first of the new Missouri Pacific Diesel Freight Locomotives made history when it broke all existing load and speed records on the railroad by hauling 115 cars, totaling 4339 tons, on its 515 mile maiden run from Dupo, Illinois, to Texarkana, Texas, in 20 hours and 8 minutes. This running time was almost 14 hours ahead of the schedule for "symbol" oil trains, which are the hottest and fastest freight trains handled by this or any other railroad. *But this inaugural run was only the beginning.* On the return trip with 120 loaded tank cars and 3 empties, the "Big Jeep" (as it has been dubbed by the operators) made the trip in 18 hours and 15 minutes, hauling 6835 actual tons which, so far as is known, constituted what was then a train load record. However, this mark was doomed for a fall. On the Texarkana-Dupo run of December 13, 1943, the General Motors 5400 Hp. Diesel Freight Locomotive handled 7064 actual tons, pulling 124 loads and 3 empties. At this time, these two 5400 Hp. Freight Diesels are being operated as four 2700 Hp. locomotives until additional Freight Diesels are received. Two 2700 Hp. Freight Diesels are now operating between Dupo and Alexandria and two between Dupo and Texarkana.

ELECTRO-MOTIVE DIVISION

GENERAL MOTORS CORPORATION LA GRANGE, ILLINOIS, U.S.A.

1,000 volts per mil of thickness. Its bonding temperature is approximately 150 deg. C. The tape is used for insulating wires, cables and electrical equipment and also for protecting wiring, piping and equipment exposed to caustic or corrosive fumes, oil, grease, acids, alkalis or moisture.

Adjustable Tool Holder

An adjustable tool holder with a vise grip for use in lathes, shapers, and planers is announced by the Robert H. Clark Company, Beverly Hills, Calif. Any of four or more sizes of tool bits can be used in a single holder. Models available are the 15-deg. sloping cutter, channel type, and the horizontal or parallel channel type in both right- and left-hand offset. Each type is available in several shank sizes.

In addition, the Clark tool holder has a special vise-grip jaw which has a unique clamping action for holding the bit vertically and horizontally with pressure evenly distributed over the entire holder channel, thus preventing tool-bit breakage. It completely eliminates the possibility of a pocket or sag developing in the bottom of the holder channel which the manufacturer claims is a frequent source of trouble when tool bits are clamped with a screw contact at a single point. The shape and position of the head of this tool holder affords the operator an unobstructed view of the tool-bit cutting edge.

This vise grip offers another important saving by rigidly and firmly holding very short tool bits, thus effecting economies by using up short tool bits which might otherwise require scrapping. Square, round, out-of-round, undersize or dual narrow bits for cutting-off or forming operations all are held with equal rigidity. This ability to hold narrow tool bits saves much time and avoids tool-steel waste from grinding square bits to narrow shapes for cutting off and special turning, grooving, threading and facing operations, since tools of the correct width and shape may be used with difficulty.

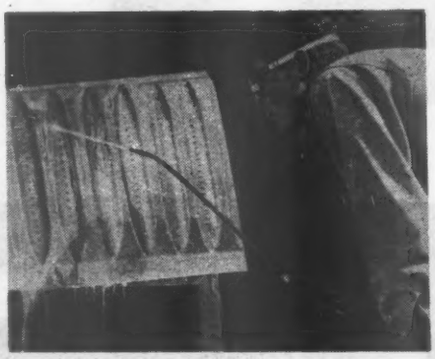
These tool holders are especially suitable for using Stellite and other extra hard cast-alloy tool bits, since the even distribution of pressure in the holder will prevent breakage of these brittle and expensive alloys that is frequently caused by single point clamping methods.

Clark adjustable tool holders are drop forged of tool steel. They are heat treated and hardened for maximum resistance to wear, especially in the holder channel directly under the clamping device to prevent worn pockets in the cutter channel.

Tool holder with a vise-grip jaw

Water-Soluble Paint Stripper

A highly efficient, water-soluble paint stripper that loosens paint for speedy removal with water has been developed by Turco



After application of a water-soluble paint stripper the surface can be rinsed with clear water, steam or air and water

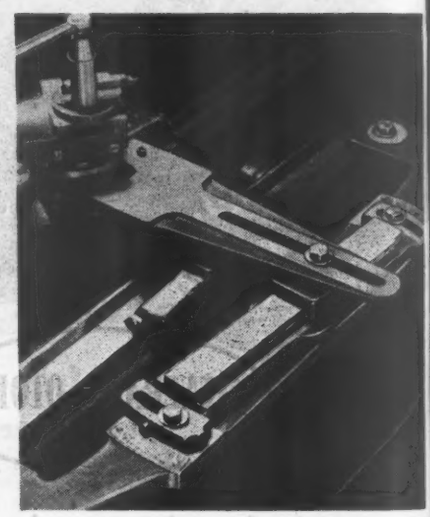
Products, Inc., 6135 South Central avenue, Los Angeles, Calif. It is said that the hosing off of an application of this stripper leaves a clean, paint-free, water-break-free surface requiring very little after treatment to prepare for further processing. The new material, known as Turco Stripper L-780, is said to be non-corrosive on metals, making it safe for use and recommending it for the removal of zinc chromate primer as well as other paint coatings, and to be safe on wood with no tendency to cause warping. It is in line with Navy Specification C-113 for non-inflammability of paint strippers, eliminating the need for the usual dangerous highly inflammable stripping materials.

Because of the water soluble characteristic of the product, brushes and cleaning equipment can be cleaned for re-use quickly and completely by a vigorous churning in a bucket of water. Another time and labor-saving advantage is the slow rate of evaporation, which makes one coating usually sufficient to complete a stripping job. Surfaces which are oily or covered with road film need no pre-cleaning before applying Stripper L-780.

Applied with brush or spray, the material is left on the surface until it tests ready for removal (5 to 20 minutes). Loosened paint is scrubbed with a water-saturated brush to form a slurry. The slurry is then removed by hosing with water, steam or air-and-water gun. The stripper, being free rinsing, leaves a water-break-free surface.

Lathe Taper Attachment

A taper attachment for lathes intended to make accurate turning, boring, threading, etc., as easy as any straight-line-tool operation is being produced by the Master-Taper



Tapering operations on a lathe are accurately performed with this easily applied attachment

Company, 126 North Clinton street, Chicago 6. It may be used in any position on a lathe, and does not interfere with straight turning. The sliding fixture has straight gibs eliminating vibration and tool play. Graduations are in inches at one end and in degrees at the other end of a swivel bar. It tapers up to 3½ in. per ft., 16½ deg. maximum in either direction, 7½ in length at one setting. It duplicates tapered parts correctly for accurate production.

Ease of application is a feature and the device can be attached or removed in minutes. Sturdy construction with adjustments compensating for wear, assure dependability in long use. It is accurately fitted to Logan 10-in., Atlas 10-in., South Bend 9-in., Sheldon and Clausing lathes. Taper attachments for other lathes are manufactured to order.

NEWS

O. D. T.'s Steel Requests Cut One-Third

CONTROLLED materials for domestic transportation in this year's fourth quarter have been reduced by about one-third from the amounts requested by the Office of Defense Transportation, the principal factor being the anticipated sharp reductions in the allocations for rail and track accessories. O. D. T., as claimant agency for the domestic transportation industry, asked for 1,532,633 short tons of carbon steel, but has been advised by the War Production Board that its allotment will be 1,039,100 tons.

The new replacement-rail request was cut from 550,000 tons to 360,000 tons and allocations for track accessories from 291,000 tons to 190,000 tons.

Carbon-steel requirements for locomotives, freight cars, and marine equipment "were met," but no allotment was made for railroad passenger cars for which O.D.T. requested 6,488 tons. The 160,000 tons requested for automotive replacement parts was cut to 145,000 tons, and a 76,562-ton allotment requested for light trucks was refused.

The carbon-steel allotments, it is pointed out, carry with them "proportionate amounts" of alloy steel, copper, and aluminum.

In addition, W.P.B. "has set aside an adequate reserve for railroad and local maintenance, repair, and operating supplies."

Odiorne in Charge of W.P.B. Car and Engine Sections

IN a move to reorganize the Transportation Equipment Division of the War Production Board, the motive power and rolling stock sections of the division have been consolidated in one unit, which will be under the supervision of D. W. Odiorne, former chief of the rolling stock section. The deputy chief in charge of locomotives is M. K. Tate, while the deputy chief in charge of rolling stock is James Driscoll. Procedures and personnel of the sections will not be affected by the change, it is understood.

Improper Car Repairs Waste Manpower

IN a letter dated August 10, V. R. Hawthorne, executive vice-chairman of the A.A.R. Mechanical Division, states that certain repair points, fully equipped to make proper repairs to freight cars without undue delays, are resorting to wrong repairs of a temporary nature in order to release as many cars as possible within a given period of time.

While such practices may result in a larger shop turnover of cars repaired, Mr. Hawthorne points out that, where the repairs are not of a lasting nature the same car has subsequently to be shopped within a short period of time; thus the net result is a much greater delay than there would have been had the car been held a little longer in the previous shopping and repairs properly performed.

This matter was previously covered in an A.A.R. circular letter of December 22, 1941, and it is urged in the interest of manpower conservation and expeditious handling of freight cars that proper action be taken to carry out the intent of this circular consistently in all cases.

Where cars are sent to a contract shop for repairs, the car owner is requested to impress upon the contract shop management the necessity for making complete and permanent repairs as outlined in this circular.

Radio in C. N. R. Yard Operation

AN initial test of the two-way radio communication system made recently in the Montreal terminal area of the Canadian National has been pronounced satisfactory by engineering officers of the railroad and the Canadian Marconi Company. This was the first time that radio communication had been used in Canada for the operation of trains. During a series of further tests, two locomotives, a Diesel and an electric, will operate in and out of the terminal on instructions their respective enginemen receive by radio.

For the tests, 50-watt transmitters of the frequency-modulation type operating on 38.6 megacycles are being used. This system gives freedom from static and other interference, particularly where trolley wires are located. It has a possible 20-mile range but, for the time being, less than half of that range will be required by the two locomotives during the test period. The transmitter is housed in a signal control tower, immediately north of the C. N. R. lift bridge crossing Lachine canal. On top of the lift bridge is a 20-ft. antenna, approximately 175 ft. above the ground.

Each locomotive is also equipped with a 50-watt transmitter, a receiving set, loudspeaker, microphone and antenna. For the tests, two antennas have been applied, one horizontal and the other vertical. The Department of Transport at Ottawa has issued a temporary license to the railroad for the broadcasting of instructions to trains in the Montreal area.

The tests are being conducted under the supervision of R. G. Gage and H. F. Finnemore, of the Canadian National, and S. G. Patterson and R. Desaulniers, of the Canadian Marconi Company.

C. R. I. & P. Tests Facsimile On Moving Train

ON August 15 the Chicago, Rock Island & Pacific demonstrated the use of radio-controlled facsimile machines for the transmission of handwritten or typewritten messages from an office at Blue Island, Ill., to the caboose on a freight train en route westward from Blue Island to Joliet, Ill.

The facsimile-sending equipment on the Blue Island station includes an electric eye (photo-electric cell) which is operated on

(*Continued on second left-hand page*)

* * *

Two 1,000-hp. Alco-G.E. Diesel locomotives have been installed on a 62.5-mile division of the 1,234-mile route of the Alaska Railroad between Whittier and Anchorage—The two locomotives are run as a pair and handle trains up to 2,250 tons—Train length with steam power was limited to about 25 cars; the Diesels handle about 50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THIS SCHOOL TRAVELED A MILLION MILES AND HAD A MILLION PUPILS

The "Little Red Schoolhouse" of several generations of railroad men rolled on wheels; it was the famous instruction car of the Westinghouse Air Brake Company. Beginning its journeyings in 1889, during the next 30 years it covered almost every mile of main-line trackage in the country.

The benefits were so apparent that today instruction cars are a regular part of railroad training programs.

75 Years of Pioneering

WESTINGHOUSE AIR BRAKE COMPANY, WILMERDING, PA.

1869 1944

TO PERMIT TODAY'S TRAINS TO MOVE AT SHORTER INTERVALS WITH HEAVIER LOADS AT HIGHER SPEEDS—SAFELY.

From the beginning, this organization has concentrated on providing railroads with complete information on air brake operation and maintenance. This broad program of demonstration and education has helped to assure maximum utilization and extend useful life of equipment.

Orders and Inquiries for New Equipment Placed Since the Closing of the September Issue

Locomotive Orders

Road	No. of Locos.	Type of Loco.	Builder
Alton	1[1]	Diesel-elec. pass.	Electro-Motive
	5[1]	Diesel-elec. switch	American Loco. Co.

Freight-Car Orders

Road	No. of Cars	Type of Car	Builder
Alton	500	50-ton box	Pullman-Standard
	250	50-ton gondola	General American Trans. Corp.
	600	50-ton box	American Car & Foundry Co.
	150	50-ton hopper	American Car & Foundry Co.
Baltimore & Ohio	1,000[2]	50-ton hopper	Bethlehem Steel Co.
	500[2]	50-ton box	General American Trans. Corp.
	200[2]	50-ton auto. box.	Greenville Steel Car Co.
Canadian Pacific	750	50-ton box	Canadian Car & Fdry. Co.
	200	50-ton refrig.	National Steel Car Co.
	200	70-ton gondola	Eastern Car Co.

Passenger-Car Orders

Road	No. of Cars	Type of Car	Builder
New York, Chicago & St. Louis	5	Exp.-bagg.	American Car & Fdry. Co.

Passenger-Car Inquiries

Atchison, Topeka & Santa Fe..	23	Mail-bagg.
	43	Chair
	2	Dormitory-lounge
	6	Lunch-counter dining
	6	Dining
Northern Pacific	24 or 36	Alloy-steel coaches
Wabash	1	Bagg.-mail
	1	Baggage
	1	Coach

[1] Authorized by District Court at Chicago. The six locomotives will cost $562,000.
[2] The 1,700 cars will cost approximately $5,250,000.

a lead-screw assembly to scan the message on a sheet of paper wrapped about a cylinder. The amount of light reflected from the paper changes the modulation characteristic of a 5,000-cycle note. This gives an amplitude modulated note, depending on the blackness of the typing in contrast with the white sheet of the message being scanned. This amplitude modulated component is transmitted by frequency modulation radio to the receiving equipment on the caboose. The equipment is arranged to transmit either on 80-kilocycle carrier or on 40-megacycle frequency-modulated carrier. The facsimile equipment on the caboose is about the same, mechanically, as the sending machine. The amplitude-modulated note, being received, gives carrying voltage across a sheet of paper. The greater the voltage the more the particular spot of paper is darkened, thus reproducing the writing.

The operations of the sending and receiving facsimile machines are synchronized. The machine in the office is operated by a synchronous motor from the local 60-cycle supply. On the caboose, a syncronizing unit includes an 1,800-cycle tuning fork which triggers a multi-vibrator. This vibrator oscillates at 60 cycles per second which is amplified and drives a synchronous motor. A small change on the 1,800-cycle fork will change the phase of the motor, and the motor can be "locked" in with the one at the office by means of this phasing control.

An inductive coupling carrier system, using a loop on the caboose and wires on the pole line, was in service to provide two-way telephone communication between the caboose and the station at Blue Island. The loop consists of four turns of wire on a frame lengthwise around the body of the car. An electric field is set up between this loop and two wires on the pole line along the right of way. The 80-kilocycle energy from the loop is inductively received by the wires on the pole line and transmitted over these wires to the office. Similarly, when the office is transmitting, the 80-kilocycle energy on the pole line wires is inductively received by the loop on the caboose to operate the receiving apparatus. The 80-kilocycle carrier current does not interfere with the use of the wires on the pole line for other forms of communication previously in service.

Two-way telephone communication between the caboose and the cab in the locomotive of the freight train was provided by radio apparatus operating at 30-40 megacycles, frequency modulated. Among the various guests on this demonstration trip were the superintendents of telegraph of seven large railroads, and representatives of the Federal Communications Commission and the Interstate Commerce Commission.

Miscellaneous Publications

Seamless Steel Tubes. — Seamless Steel Tube Institute, Pittsburgh 19, Pa. 320-page loose-leaf binder, 8½ in. by 11 in. Price, $2.50. This new book on tubing, for which supplementary sheets will be issued from time to time, is divided into four principal sections, with guide index, covering general data, mechanical tubing, pressure tubing and reference tables. Under General Data there is a brief summary on the history, manufacture, tests, special shapes and standard steels with chemical composition, mill practices, etc. The section on Mechanical Tubing covers information on typical uses, suggestions of how to obtain best results through the use of tubing, determining proper size, with complete tolerance tables, properties for beams, and a digest of standard specifications. Under Pressure Tubing and Reference Tables covers various pressure formulae, specifications and tolerance tables for boiler tubes, heat echanger and condenser tubing, still tubes, alloy steel pipe, stainless steel analyses, with metallurgical data. The Reference Table section is unusually extensive with many formulae, weight tables for rounds, squares, rectangles, surface areas both inside and outside, and other tables commonly found useful in tubing applications.

Missouri Pacific to Spend Over $5,000,000 for Equipment

The Missouri Pacific has been granted permission by the Federal District court at St. Louis, Mo., to spend $5,732,950 for new equipment and roadway improvements. Included are $3,914,000 for 1,000 box cars and $1,357,000 for seven Diesel-electric freight locomotives.

Schwartz Named Chairman of Railway Labor Panel

President Roosevelt on July 7 named Harry H. Schwartz a member and chairman of the National Railway Labor Panel to succeed Dr. William M. Leiserson, whose resignation from this post accompanied his resignation from the chairmanship of the National Mediation Board, in which position he also was succeeded by Mr. Schwartz.

Shop Construction

St. Louis-San Francisco.—The Frisco has awarded a contract, amounting to $36,000, to Chapman & Bramer, Springfield, Mo., for the construction of seven stalls of an enginehouse at Armory, Miss., to replace a similar number of stalls which were destroyed by fire in December, 1943.

Virginian.—The Virginian has awarded a contract for the construction of shop buildings at Princeton, W. Va., at an estimated cost of $400,000, to the Trimble Company, Pittsburgh, Pa.

Former A. C. L. Employee Promoted in Italy

Charles O. Butler, commanding officer of the 753rd Railway Shop Battalion, Military Railway Service, and former Atlantic Coast Line employee, has been promoted from the rank of major to lieutenant colonel, according to word from M. R. S. headquarters in Italy.

Before being transferred to the 753rd battalion several months ago, Colonel Butler had performed as master mechanic with an M. R. S. grand division, in this theater of operations. During World War I he served in nearly every enlisted grade, ending up as a first sergeant in the Air Corps. Starting out as captain in the present conflict, he has since received the Soldier's Medal and the Legion of Merit for outstanding services in the African and Italian campaigns.

Directory of Mechanical Associations and Railroad Clubs

(List gives names of secretaries, dates of next regular meetings, and places of meetings of mechanical associations and railroad clubs)

ALLIED RAILWAY SUPPLY ASSOCIATION.—J. F. Gettrust, P. O. Box 5522, Chicago.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS.—H. H. Henline, 33 West Thirty-ninth street, New York 18.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS. C. E. Davies, 29 West Thirty-ninth street, New York 18.

RAILROAD DIVISION.—E. L. Woodward, *Railway Mechanical Engineer*, 105 West Adams street, Chicago 5.

ANTHRACITE VALLEY CAR FOREMEN'S ASSOCIATION.—Wm. J. Thomas, secretary, 928 Acker Ave., Scranton, Pa. Meets January, March, May and ovember at Scranton, Pa. February, April, October and December at Wilkes-Barre, Pa.

ASSOCIATION OF AMERICAN RAILROADS.—Charles H. Buford, vice-president Operations and Maintenance Department, Transportation Building, Washington 6, D. C.

OPERATING SECTION.—J. C. Caviston, 30 Vesey street, New York 7.

MECHANICAL DIVISION.—A. C. Browning, 59 East Van Buren street, Chicago 5.

PURCHASES AND STORES DIVISION.—W. J. Farrell, Executive Vice Chairman, Transportation Building, Washington 6, D. C.

MOTOR TRANSPORT DIVISION.—George M. Campbell, Transportation Building, Washington 6, D. C.

CANADIAN RAILWAY CLUB.—R. C. Crook, 4415 Marcil avenue, N. D. G., Montreal, Que. Regular meetings, second Monday of each month, except June, July and August, at Windsor Hotel, Montreal, Que.

CAR DEPARTMENT ASSOCIATION OF ST. LOUIS.—J. J. Sheehan, 1101 Missouri Pacific Bldg., St. Louis, Mo. Regular monthly meetings third Tuesday of each month, except June, July and August, DeSoto Hotel, St. Louis.

CAR DEPARTMENT OFFICERS ASSOCIATION.—J. H. Stremmel, 6536 Oxford avenue, Chicago.

CAR FOREMAN'S ASSOCIATION OF CHICAGO.—Ralph J. Feddor, 2803 North Campbell avenue, Chicago. Regular meetings, second Monday in each month, except June, July and August, La Salle Hotel, Chicago.

CAR FOREMEN'S ASSOCIATION OF OMAHA, COUNCIL BLUFFS AND SOUTH OMAHA INTERCHANGE.—H. E. Moran, Chicago Great Western, Council Bluffs, Ia. Regular meetings, second Thursday of each month.

CENTRAL RAILWAY CLUB OF BUFFALO.—R. E. Mann, Room 1840-2, Hotel Statler, Buffalo, N. Y. Regular meetings, second Thursday of each month, except June, July and August, at Hotel Statler, Buffalo.

EASTERN CAR FOREMAN'S ASSOCIATION.—W. P. Dizard, 30 Church street, New York 7. Regular meetings, second Friday of January, February, March, April, May, October, and November at Engineering Societies Bldg., 29 West Thirty-ninth street, New York 18.

INDIANAPOLIS CAR INSPECTION ASSOCIATION.—H. P. Bramblett, care of H. P. Ruck, car foreman, Pennsylvania, 764 South Emerson avenue, Indianapolis,, Ind. Regular meetings, first Monday of each month, except July, August and September, in Indianapolis Union Station, Indianapolis, at 7 p. m.

LOCOMOTIVE MAINTENANCE OFFICERS' ASSOCIATION.—C. M. Lipscomb, 1721 Parker St., North Little Rock, Ark.

MASTER BOILER MAKERS' ASSOCIATION.—A. F. Stiglmeier, secretary, 29 Parkwood street, Albany 3, N. Y.

NEW ENGLAND RAILROAD CLUB.—W. E. Cade, Jr., 683 Atlantic avenue, Boston, Mass. Regular meetings, second Tuesday in each month, except June, July, August and September, at Hotel Vendome, Boston, Mass.

NEW YORK RAILROAD CLUB.—D. W. Pye, Room 527, 30 Church street, New York 7. Meetings, third Thursday in each month, except June, July, August, September and December, at 29 West Thirty-ninth street, New York 18.

NORTHWEST CAR MEN'S ASSOCIATION.—E. N. Myers, chief interchange inspector, Minnesota Transfer Railway, St. Paul, Minn. Meetings first Monday each month, except June, July and August, at Midway Club rooms ,1931 University avenue, St. Paul.

NORTHWEST LOCOMOTIVE ASSOCIATION.—G. T. Gardell, 820 Northern Pacific Building, St. Paul, Minn. Meetings third Monday of each month, except June, July and August.

PACIFIC RAILWAY CLUB.—William S. Wollner, P. O. Box A, Sausalito, Calif. Regular meetings, second Thursday of each alternate month at Palace Hotel, San Francisco, Calif., and Hotel Hayward, Los Angeles.

RAILWAY CLUB OF PITTSBURGH.—J. D. Conway, 308 Keenan Building, Pittsburgh, Pa. Regular meetings, fourth Thursday in month except June, July and Augugst, Fort Pitt Hotel, Pittsburgh, Pa.

RAILWAY FUEL AND TRAVELING ENGINEERS' ASSOCIATION.—T. Duff Smith, Room 811, Utilities Building, 327 South La Salle street, Chicago.

RAILWAY SUPPLY MANUFACTURERS' ASSOCIATION.—J. D. Conway, 308 Keenan Building, Pittsburgh, Pa.

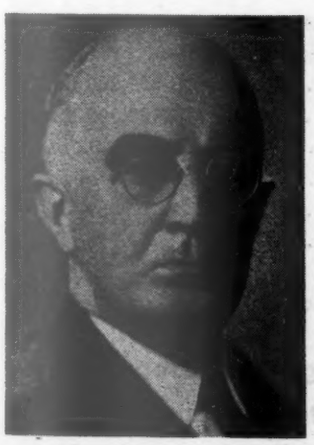
SOUTHERN AND SOUTHWESTERN RAILWAY CLUB.—A. T. Miller, 4 Hunter St., S. E., Atlanta, Ga. Regular meetings, third Thursday in January, March, May, July and September. Annual meeting, third Thursday in November, Ansley Hotel, Atlanta, Ga.

TORONTO RAILWAY CLUB.—D. M. George, Box 8, Terminal A, Toronto, Ont. Meetings, fourth Monday of each month, except June, July, and August, at Royal York Hotel, Toronto.

WESTERN RAILWAY CLUB.—E. E. Thulin, executive secretary, Suite 339 Hotel Sherman, Chicago. Regular meetings, third Monday in each month, except June, July, August, September, and January, Hotel Sherman, Chicago.

Supply Trade Notes

GENERAL AMERICAN TRANSPORTATION CORPORATION.—*Thomas McLean Jasper*, for the past 18 years director of research for the A. O. Smith Corporation, has been appointed technical and research director for the General American Transportation Corporation with headquarters in Chicago. Mr. Jasper was educated at Illinois University and Wisconsin University. In the last war



Thomas McLean Jasper

he served four years with the British Army, attaining the rank of major of artillery. Prior to his association with the A. O. Smith Corporation, he was assistant professor of mechanics at the University of Wisconsin and associate professor of engineering materials and engineer of tests at Illinois University for the fatigue of metals investigation under the auspices of the National Research Council. He also served for two years as an examiner in the bureau of efficiency engineering in Chicago.

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CHAMPION RIVET COMPANY.—*N. J. Carbis* has been appointed special railroad representative for the Champion Rivet Company, Cleveland, Ohio.

◆

QUICAP COMPANY.—*Arthur R. Hamilton*, sales representative in the New York office of the Safety Car Heating & Lighting Company, who has been associated with that company for the past 22 years, has resigned to take an executive position with the Quicap Company of New York.

Army-Navy "E" Awards

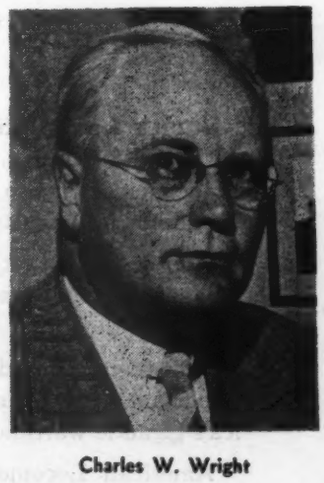
Edward G. Budd Manufacturing Company, Philadelphia, Pa. First award.

Yale & Towne Manufacturing Company. Stamford division.

Maritime "M" Award

H. K. Porter Company, Fort Pitt Steel Casting Company, McKeesport, Pa. Third silver star.

PULLMAN-STANDARD CAR MANUFACTURING COMPANY.—*Charles W. Wright*, vice-president of the Pullman-Standard Car Manufacturing Company, has also been elected president of the Pullman-Standard



Charles W. Wright

Car Export Corporation to succeed *C. A. Liddle* who remains as a director. *Thomas P. Gorter*, vice-president at Chicago, has been appointed sales director of transportation equipment for the United States, Canada and Mexico and has been elected a director of the Pullman-Standard Car Export

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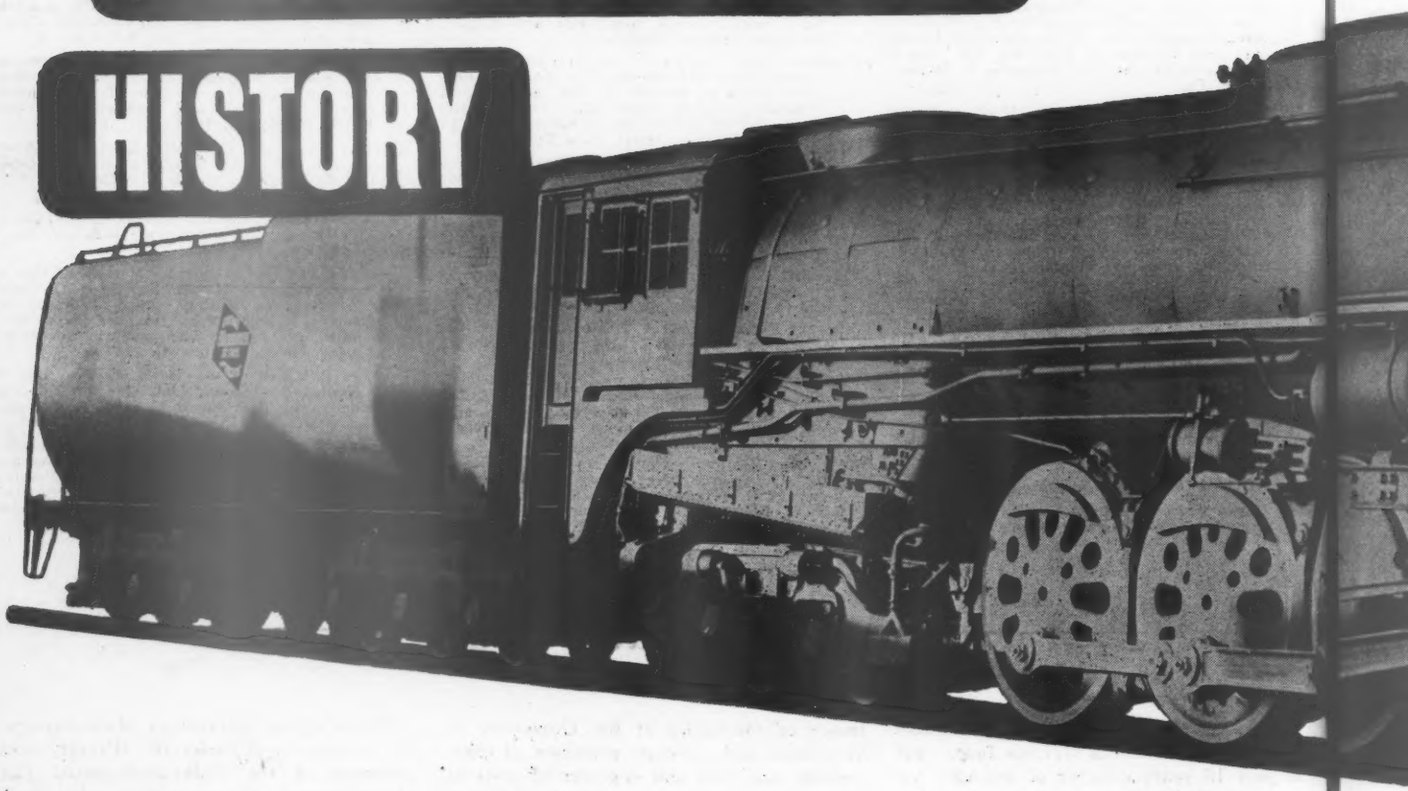
LOCOMOTIVES THAT ARE MAKING HISTORY



BUILT for the Milwaukee—the last word in 4-8-4 design. Ten delivered in July—in the nick of time to meet the heavy western traffic now running toward an all-time peak!

Another proof that ALCO Locomotives have what it takes to enable American railroads to handle their job.

American railroading achievement is an important chapter in the history of America's gigantic wartime effort.

American Locomotive Company's readiness with locomotives well designed to meet unprecedented requirements here and abroad is part of that history.

When peace comes American Locomotive Company will be equally ready.

Here are the "SPECS":

Weight on Drivers	259,300 lbs.
Weight of Engine	460,000 lbs.
Cylinders	26 x 32 in.
Diameter of Drivers	74 in.
Boiler Pressure	250 lbs.
Tractive Power	62,000 lbs.
Tender Capacity–Fuel	25 tons
Tender Capacity–Water	20,000 gals.

Locomotive designs developed by American Locomotive Company have been, are, and will continue to be powerful factors in American railroad operating efficiency and economy.

Corporation. *John W. Scallan*, assistant vice-president at Chicago, has been elected vice-president in charge of the sales of transportation equipment and war material in Chicago and the middle West. *R. V. Chase*, works manager at Worcester, Mass., has been appointed also New England district manager in charge of railroad equipment sales in that region with headquarters at Worcester.

Charles W. Wright began his career in 1899 when, while still in his teens, he entered the employ of the Baker Forge Company in Pittsburgh, Pa. Mr. Wright continued in the employ of successor companies, the Steel Car Forge Company and the Standard Steel Car Company. In 1931, when Pullman and Standard combined to become Pullman-Standard, he was elected vice-president. He assumed charge of war equipment sales in September 1940.

John W. Scallan was born in Cincinnati, Ohio, in 1902, and is a graduate of Notre Dame (1925). He entered the employ of the

John W. Scallan

Pullman-Standard Car Manufacturing Company in 1926 as a sales agent, and six years later was appointed sales manager of the Western district. In 1942 he became assistant vice-president.

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FAIRBANKS, MORSE & COMPANY.—Fairbanks, Morse & Company, Chicago, has purchased the *Pomona Pump Company*, a division of the Joshua Hendy Iron Works. The acquisition included all physical assets, patents and trade marks. The Pomona Company has plants in St. Louis, Mo., and Pomona, Calif. No change in factory or sales personnel of the Pomona Company is contemplated.

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CARBOLOY COMPANY, INC.—*The Garrett Supply Company*, 3844 South Santa Fe, Los Angeles 11, Calif., has been appointed Carboloy distributor for the Southern California-Arizona area, supplementing direct service operations of the Carboloy Company's branch at 5905 South Pacific Boulevard, Los Angeles. A Carbide training course, essentially the same as the 5½-day course originally inaugurated at the Detroit, Mich., plant of the Carboloy Company, will be conducted at Garrett headquarters in Los Angeles by Garrett representatives who have completed a training course in all technical aspects of carbide tools at Detroit.

CLEVELAND WIRE SPRING COMPANY.—*Robert E. Lewis*, treasurer of the American Steel & Wire Company, a subsidiary of the U. S. Steel Corporation, has been elected president of the Cleveland Wire Spring Company.

◆

AMERICAN CAR AND FOUNDRY COMPANY.—*Charles J. Hardy, Jr.*, formerly member of the law firm of Hardy, Stancliffe and Hardy, and until recently on active duty with the United States Navy, has been elected a vice-president and a director of American Car and Foundry Company. *E. J. Finkbeiner* has been appointed a vice-president and will continue in the operating department where he has served since 1922. *Andrew Speirs*, assistant vice-president of the company, with headquarters at Chicago, has retired after 53 years of service. *Olin H. Philips* has been appointed in charge of the laboratory metallurgical research work of all plants to succeed *John W. Steinmeyer*, who has been transferred to the research department at New York. *George C. Beeson*, formerly attached to the engineering departments of the Berwick, Pa., and St. Charles, Mo., plants has been transferred to the New York sales office as sales engineer, giving particular attention to passenger car equipment. *Wilbur C. Osha*, until recently general welding superintendent at the Berwick, Pa., plant, has been appointed general supervisor of welding.

Andrew Speirs started his career as a stenographer in the employ of the Wells & French Company, and in 1898, shortly after this company was taken over by the American Car and Foundry Company, he became a salesman. He was appointed assistant vice-president on February 8, 1930.

George C. Beeson is a graduate of Purdue University where he received a degree in mechanical engineering in 1930. While attending college, he worked during summer vacations at the Jeffersonville, Ind., plant of the American Car and Foundry Company and upon graduation was employed full-time at that plant. He joined the Anglo-

George C. Beeson

American Milling Machinery Company of Owensboro, Ky., in 1932. He returned to the American Car and Foundry Company in 1934 and was assigned to passenger-car engineering in the Berwick plant. He was transferred to the western division of the engineering department at St. Charles in 1941.

AMERICAN LOCOMOTIVE COMPANY.—*Alexis J. Diakoff*, head of the mechanical engineering department of the University of North Dakota, has been appointed consulting engineer of the Diesel engine department at the Schenectady, N. Y., plant of the American Locomotive Company. Mr. Diakoff is a graduate of the Moscow Institute of Technology, also of Michigan University, from each of which he received a degree in mechanical engineering. He was chief engineer of a submarine of the Russian Black Sea fleet during the first world war. When the fleet was evacuated to North Africa, he was appointed in charge of consultation and operation of Diesel and gas-power plants in Tunisia and Algeria. He subsequently was employed in the Diesel department of the Rennault Works, near Paris, France, testing installations and as designing engineer of Diesel en-

Alexis J. Diakoff

gines. He came to the United States in 1923 and has had association with the Ford Motor Company and the Detroit Edison Company as a designing engineer. He eventually became assistant professor of mechanical engineering at the University of North Dakota and later was appointed professor and head of that department. Mr. Diakoff was a certified C.A.A. ground school instructor in airplane engines at the university from 1937 to 1944.

◆

RANSOME MACHINERY COMPANY.—The Ransome Machinery Company, a subsidiary of the Worthington Pump & Machinery Corp., has appointed the following companies as distributors of the Ransome line of welding positioning equipment: the Post Welding Supply Company, Birmingham, Ala.; Hobart Welder Sales & Service, Cleveland, Ohio; the W. P. & R. S. Mars Company, Duluth, Minn.; the American Machinery & Supply Co., Omaha, Neb.; the Arcway Equipment Company in Pittsburgh, Pa., and Philadelphia, Baltimore, Md., and Richmond, Va.; Hobart Sales Service Supplies in Buffalo, N. Y., and Syracuse; the Peoria Welding Supply Company, Peoria, Ill.; the Big Three Welding Equipment Company in San Antonio, Tex., Corpus Christi, Dallas, Houston and Fort Worth; Moline Welding Service, Moline, Ill.; the Chicago Welding Sales Company, Chicago;

the Victory Equipment Company in San Francisco, Calif., Fresno, Los Angeles and San Diego; the Austin-Hastings Company in Cambridge, Mass., Worcester, and Hartford, Conn.; J. E. Raney & Co., Boston, Mass.; and the Welding Engineering & Sales Co. in New York, Buffalo, and Syracuse.

◆

JOSEPH SINKLER, INC.—Joseph Sinkler, Inc., Chicago, has taken over the manufacture and sales of the globe and angle valves of the *Edward O'Malley Valve Company*, Chicago.

◆

TIMKEN ROLLER BEARING COMPANY.—*R. G. Wingerter*, for the past six years an industrial engineer for the Timken Roller Bearing Company, has been appointed assistant chief engineer, industrial division.

◆

UNITED STATES STEEL CORPORATION OF DELAWARE.—*Howard E. Isham*, assistant treasurer of the United States Steel Corporation of Delaware, has been appointed also assistant vice-president.

◆

INLAND RUBBER CORPORATION.—*H. C. Kenyon* has been appointed general sales manager of the Inland Rubber Corporation, Chicago, a subsidiary of the Minnesota Mining & Manufacturing Company. Mr. Kenyon joined the Minnesota Mining & Manufacturing Company as a sales representative in 1922 and for the past ten years has been division sales manager with headquarters in Philadelphia, Pa.

◆

PITTSBURGH SCREW & BOLT CORPORATION.—*Robert L. Irvin* has been appointed works manager of the Graham plant of the Pittsburgh Screw & Bolt Corp. to succeed *George H. Lee, Sr.*, who will devote his time to experimental and advisory work for all plants of the corporation.

◆

GRAYBAR ELECTRIC COMPANY.—*J. A. Mayer*, supply sales manager for the Western Electric Company, has been appointed Atlantic district manager for the Graybar Electric Company with headquarters at Philadelphia, Pa., to succeed *A. L. Hallstrom*, who will act in an advisory capacity until January 15, 1945, when he will retire after 50 years of service.

◆

CHERRY RIVET COMPANY.—*William M. Rosborough, M.E., Harold B. Thomas*, and *P. J. St. James* have been appointed resident representatives of the Cherry Rivet Company of Los Angeles, Calif. Mr. Rosborough is in charge of the Detroit, Mich., territory, with offices in 704 Stephenson building, and Messrs. Thomas and St. James will have their headquarters at 80 Broadway, New York.

◆

KENNAMETAL, INC.—*Kennametal, Inc.*, of Latrobe, Pa., has opened offices at Kansas City, Mo., and St. Louis, both under the direction of *R. B. Weeks*, manager at Chicago. The representative at Kansas City is *Ralph H. Craig* and at St. Louis *Lyle H. Wade*. *Walter C. Lavers* has been appointed tool serviceman and representative at Los Angeles, Calif.

McCONWAY & TORLEY CORPORATION.—*Arthur D. Foster, Jr.*, has been elected president of the McConway & Torley Corporation, to succeed the late Donald Symington. *Austin L. Byrd* has been elected executive vice-president, *Enoch George, Jr.*, vice-president in charge of operations and *L. A. Townsend*, treasurer. *H. F. Dunbar* will continue as vice-president and sales manager.

◆

WILLIAM SELLERS & COMPANY.—*Kreston T. Sorenson* has been appointed vice-president in charge of production of William Sellers & Company. Mr. Sorenson became associated with the Sellers Company as assistant to the president early in 1944. A photograph and a sketch of his career appeared in the March issue, page 146.

◆

THE A. S. CAMPBELL COMPANY; HUNT-SPILLER MANUFACTURING COMPANY.—The A. S. Campbell Company, Boston, Mass., has purchased the controlling interest in the Hunt-Spiller Manufacturing Company at Boston. The Hunt-Spiller Company will continue under its present name with its facilities supplemented by machining capacity and available floor space of the Campbell Company. *Neil C. Raymond*, president of the A. S. Campbell Company, will serve as president of both companies, and *Francis W. Wheeler* has been appointed a vice-president of Hunt-Spiller. *V. W. Ellet*, president of Hunt-Spiller, who has been affiliated with that company for 33 years, is retiring at his own request. Mr. Raymond joined the Campbell Company in 1932. Prior thereto he was associated with the Packard Motor Car Company.

◆

BALDWIN LOCOMOTIVE WORKS.—*J. D. Loftis*, of the Cleveland, Ohio, office of the Baldwin Locomotive Works, has been appointed eastern district manager in charge of an office opened at 1152 Broad Street Station Building, Philadelphia, Pa. The new office will handle sales for all Baldwin divisions in Pennsylvania, Ohio, portions of Michigan and New Jersey and in the eastern seaboard states south of New Jersey. A photograph and sketch of Mr. Loftis appeared on page 297 of the June issue at the time he was appointed to the Cleveland office.

◆

AMERICAN CHAIN & CABLE COMPANY.—*Lloyd W. Hopkins* has been appointed sales manager of the Reading steel casting division of the American Chain & Cable Company. Mr. Hopkins, who will make his headquarters at Reading, Pa., has been with the company for 21 years during which time he served successively in the research and engineering development departments, as head of the technical sales department, as sales engineer for the Reading-Pratt & Cady division, and lately as chief of the priorities and contract termination department at Reading.

◆

COPPERWELD STEEL COMPANY.—*George Hamburger*, formerly with the Delta Star Electric Company, has been placed in charge of a new office opened by the Copperweld Steel Company in the Railway Exchange Building, St. Louis, Mo. Mr. Hamburger's territory comprises Missouri, Kansas, Colorado and the southern half of Illinois.

◆

RAYBESTOS-MANHATTAN, INC.—*Littleton C. Barkley*, manager of the New York office of the Manhattan Rubber Manufacturing division of Raybestos-Manhattan Inc., has been appointed sales manager of the Manhattan mechanical rubber goods sales department.

◆

INLAND STEEL COMPANY.—*Leon C. Reed*, manager of the Chicago district sales office of the Inland Steel Company, Chicago, has been appointed assistant manager of the Railroad Sales division. *Kenneth J. Burns*, assistant to the manager of the Plate and Shape Sales division has been appointed Chicago district sales manager.

◆

R. H. WEBER, sales engineer of W. H. Miner, Inc., has resigned to become a manufacturers agent with offices at San Francisco, Calif. Mr. Weber will represent Ajax-Consolidated Company, Binks Manufacturing Company, Illinois Railway Equipment Company, Railway Truck Corporation, and Morton Manufacturing Company.

◆

VANADIUM CORPORATION OF AMERICA.—*John B. Girdler*, sales representative for the past four years, has been appointed sales manager, eastern district of the Vanadium Corporation, with headquarters at New York.

◆

CHAMPION RIVET COMPANY.—*N. J. Carbis* has been appointed special railroad representative of the Champion Rivet Company, Cleveland, Ohio.

Obituary

JOHN P. MOSES, formerly manager of railroad sales for Joseph T. Ryerson & Son, died August 18 in Chicago. Mr. Moses, who was 73 years of age, had been associated with the Ryerson company for 41 years. He began his career with the company in the operating department and was later transferred to commercial sales and then to railroad sales. He was appointed manager of the railroad sales department in 1924. A few years ago he relinquished management of the department but continued to serve in an advisory capacity.

John P. Moses

(*Turn to second left-hand page*)

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JOHN C. DILWORTH, manager of sales in the railroad materials and commercial forgings division of the Pittsburgh and Chicago districts of the Carnegie-Illinois Steel Corporation, died on August 23, in Pittsburgh, Pa.

◆

ARGYLE CAMPBELL, president of the Enterprise Railway Equipment Company, Chicago, whose death in California on August 12 was reported in the September issue, was born at Bethany, W. Va., on December 12, 1874, and was a graduate

Argyle Campbell

of Bethany College in 1895. He began his railway career with the Pennsylvania in the same year and three years later resigned to enter the employ of the Pressed Steel Car Company where he advanced to mechanical engineer. In 1902, he resigned to become assistant to the president of the Standard Steel Car Company at Pittsburgh, Pa., and later was appointed western sales representative at Chicago. In 1905 he formed the Enterprise Railway Equipment Company, and served as vice-president until 1908 when he was elected president.

◆

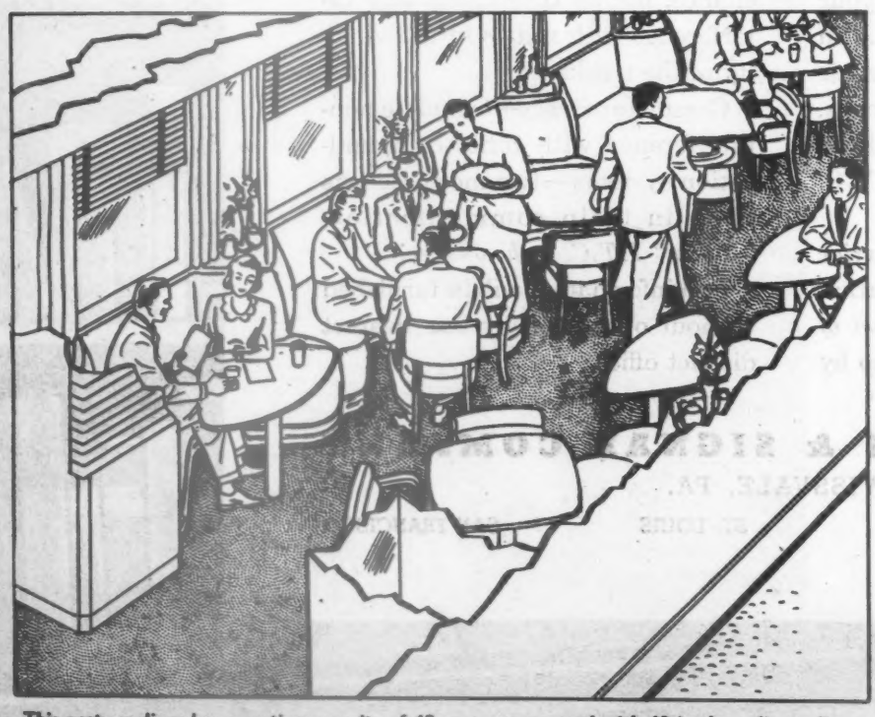
HARRY SCOTT WHERRETT, chairman of the board of directors of the Pittsburgh Plate Glass Company, died August 13. Mr. Wherrett was 68 years of age. He began his career with the company as an office boy 53 years ago.

◆

CHARLES EDWARD LEACH, a former vice-president and director of the New York Air Brake Company, died September 4. Mr. Leach was 76 years of age. He began his career with the Eames Vacuum Brake Company and had been associated with the New York Air Brake Company since its organization in 1890. He was employed in the sales division of the company during most of his career, later serving in the executive and financial departments. He was secretary tnd treasurer from 1930 to 1940 and was elected a vice-president in 1940. He also was a director of the company in 1894-95 and again from 1929 to June, 1943, when he retired because of illness.

◆

SIMON HOFFMANN, who was sent to this country to incorporate the Locomotive Superheater Company, predecessor of the Superheater Company, by Dr. Wilhelm Schmidt, inventor of the Schmidt locomotive superheater, died at Berkeley, Calif., on September 8. Mr. Hoffmann was 69 years old.



This postwar diner has a seating capacity of 42 persons compared with 48 in the ordinary diner —Such an arrangement is included in dining-car plans prepared by the Pullman-Standard Car Manufacturing Company—Aside from its club-like atmosphere, it eliminates conflict between waiters and arriving and departing guests

Trade Publications

Copies of trade publications described in the column can be obtained by writing to the manufacturers, preferably on company letterhead, giving title. State the name and number of the bulletin or catalog desired, when it is mentioned.

DOLFINITE PRODUCTS.—Dophin Paint & Varnish Company, 900 Champlain street, Toledo 3, Ohio. Catalog features complete line of Dolfinite products, including air and dust sealers, aluminum paint, anti-rust coatings, exterior and interior finishes, floor matting and linoleum cements, spot welding sealers, etc.

◆

STEEL GRATING AND STAIR TREADS.—Wm. F. Klemp Company, 6601 S. Melvina avenue, Chicago 38. Twenty-four page, illustrated catalog of Klemp open-steel grating and stair treads, riveted and welded types.

◆

LANDIS CHASERS.—Landis Machine Company, Waynesboro, Pa. Booklet, "More Production from Landis Chasers," lists 10 vital things to do with tap chasers; discusses die chasers, gives 12 reasons for their mechanical failure of, and tells how to grind die chasers.

◆

WELDING CHART.—Hobart Brothers Company, Troy, Ohio. Wall chart illustrating basic character of welding symbols recommended as American standard by the American Welding Society. Graphical language of welding industry shown separately for fusion welding, for resistance welding, and for those requiring both fusion and resistance welding. Twenty-three typical welded joints and sections illustrated.

◆

WATSON-STILLMAN PRODUCTS.—Watson-Stillman Company, Roselle, N. J. Bulletin No. 230-A—Direct steam and flush-mounted gauges for hydraulic presses and pumps; Bulletin No. 330-A—Vertical-horizontal press in 60- and 100-ton capacities; Bulletin A-6, Edition 3—Wire rope shears.

◆

"CORRECT DRILL POINTING."—Chicago-Latrobe Twist Drill Works, 411 West Ontario street, Chicago 10. Twelve-page illustrated booklet on correct procedure for pointing twist drills for use on all types of materials.

◆

"HYATT FOLKS AND HYATT BEARINGS."—Hyatt Bearings Division, General Motors Corporation, Harrison, N. J. A picture record of the job Hyatt folks and the Hyatt bearings they make are doing to help win the war.

◆

TAPPING AND THREADING MACHINES.—Warner & Swasey Company, Cleveland 3, Ohio. *Catalog No. 4401.* Four-page booklet of specifications for precision tapping and threading machines. *Catalog No. 4402,* a 12-page illustrated booklet descriptive of the No. 10 Warner & Swasey Precision tapping and threading machine.

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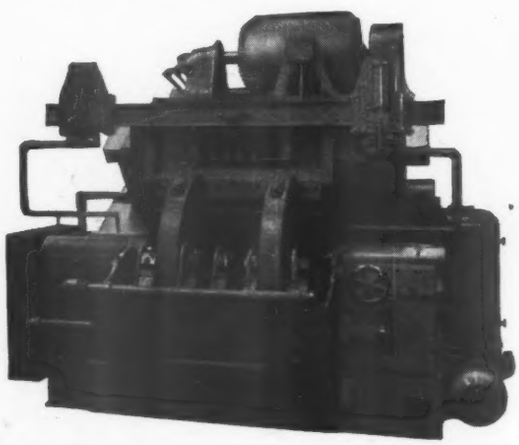

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